FORMULARY

FOR

THE PREPARATION AND EMPLOYMENT

OF MANY

NEW MEDICINES;

SUCH AS

THE NUX VOMICA, THE SALTS OF MORPHINE, THE PRUSSIC ACID, THE STRYCHNINE, THE VERATRINE, THE ALKALIS OF THE CINCHONA, THE EMETINE, THE IODINE, THE IODIDE OF MERCURY, THE CYANIDE OF POTASSIUM, THE CROTON OIL, THE SALTS OF GOLD, THE SALTS OF PLATINA, &c. &c.

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TRANSLATED FROM THE FIFTH EDITION, REVISED, AND AUGMENTED,

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AUTHOR'S PREFACE.

NOTWITHSTANDING the opposition of the physicians of the 17th century; notwithstanding the act of parliament which prohibited the emetic; in spite, even, of the ingenious sarcasms of Guy Patin, the utility of antimonial preparations has for a long while been established: for this once, at least, prejudice has submitted to evidence.

It will be the same, I trust, with the new substances which chemistry and physiology have unanimously disclosed to us as precious medicines: the repugnance which many enlightened practitioners have to prescribe them will soon disappear before the results of experience, when every day teaches us to appreciate their value.

Among the causes which have retarded the progress of the materia medica, we must number the impossibility of separating, by chemical

analysis, the several elements of which these medicines are composed. But when, even, we we have been able, at this day, to accomplish this analysis, the fear which has been and still is entertained by many, that the medicines might act altogether different upon man than they do upon other animals, would have prevented us from obtaining a knowledge of the properties of each of their principles. Nothing, however, is more false than this idea: fifteen years' experience in my laboratory, and at the bed side of the sick, enable me to affirm, *that these medicines and poisons act in the same manner upon man as upon the other animals.** My confidence in this respect is such, that I do not hesitate to use on myself the substances which I have found innocent in their effects upon other animals; and I should not advise any one to make an inverse experiment.

It is by following this course, that I have been able to determine the physiological properties and medicinal virtues of the principal part of the substances contained in this Formulary.

* It is evident, that those animals only which approach the nearest to man in their organization are here intended.

Already very numerous, these substances act by small doses; they are not mixed with any principle that disguises or prevents their action; their effects are decided and not to be mistaken, for they have been studied with care upon animals, and upon man sick and well; their chemical properties being known, and the process by which they are obtained being perfectly determined, there is no ground to fear a variation in their force or manner of acting; finally, each one presents us a remedy, not only in its greatest simplicity, but also capable of the greatest energy.

Time alone, without doubt, will pronounce definitively upon the advantages or inconveniences of these new medicines: in all cases, I have endeavored to make the work useful to the apothecary, by directing him how to prepare the medicines without referring to general treatises on chemistry and pharmacy; and by giving to physicians the facility of submitting them to their own personal experience, which, alone, is often of real utility.

I shall receive with lively gratitude the critical and other remarks relating to the substances

which are the object of this work. I thank, beforehand, those of my friends who will forward to me the results of their experience; I shall hasten to turn them to the advantage of science by inserting them in the next edition.

This edition differs from the preceding by a great number of additions and changes, to which I have been conducted, so to say, daily, by the progress of medical chemistry and pharmacology.

September, 1825.

TRANSLATOR'S PREFACE.

Since the translation of Majendie's Formulary, by Charles Thomas Haden, Esq., in 1823, an edition of which was published by Mr. Webster, of Philadelphia, in 1824, two new editions have been issued by M. Majendie, and several new articles added to the list, with many improvements made upon and more knowledge acquired respecting former articles; and, as these medicines are increasing in demand daily, the call for information on their preparation and use has not been less so. Having received the last (fifth) edition from Paris, with a number of the new remedies, it was thought that a new translation would facilitate the dissemination of knowledge on these important improvements in the materia medica, and benefit the interests of humanity.

By adding to the already too long list of medicines, alternately taken up and thrown aside,

according as carelessness or caprice dictates, we but plunge the practice into greater uncertainty and difficulty, and the science more and more into confusion. By an analytical examination of those which we know have been used with advantage in disease, we raise the veil which obscured our view of the cause of the frequent failures in their use, facilitate the practice of our profession, and circumscribe within narrow limits our range of observation; consequently strengthen our judgment on what we do observe.

This analysis, by discarding the quantities of inert and useless materials with which we have been obliged so often to fill our patients' stomachs in order to get at the advantage of the small particles of active ingredient, and which obscure and impede its action, gives us great advantages; it relieves the patient of that nausea and antipathy to taking his medicines, which are so often occasioned by large quantities of a remedy; it removes the necessity for loading and distressing the chylopoietic viscera at times when it is desirable they should be free from all causes of irritation: in the exhibition of remedies to children, where it is so necessary to disguise and concentrate them, it offers peculiar benefits—many of them being thus rendered tasteless, or

much of their disagreeable flavor being removed, which frequently resides in an inactive or useless fatty matter, removable by analysis. In rendering the medicines colorless, too, as is often the case, the advantage is not small. And especially, by enabling us to give our medicines oftener in solution, we are facilitated in our practice, besides rendering them more portable.

We know that it is difficult to overcome the prejudices of medical education and long established habits in this as in all our walks of life, and that the hurry of every day occupations, the obstinacy of opinions formed on party motives and passions, for there are parties in medicine as well as in religion and politics, throw obstacles in the way of examination, which impede medical science, but over which truth will finally triumph, though her progress be but slow.

The results of the labors of the chemists mentioned in the following work, and of the experiments of M. Majendie, completely set at nought and show the folly of that Quixotic class of men who endeavor to discard, with science, the use of chemical compounds, and other important means of cure, on account of their potency, and to reform practice by the exclusive use of vegetable remedies, many of which this work

shows have far greater power of action on the human frame than any mineral article we possess.

Did the fallacy of these pretensions, which all scientific men must appreciate as they deserve, need an exposure, it might be asked, if those "do no good do no harm" herbs and plants must only be used, why warm water alone may not answer as a substitute, as it would be still cheaper? But if those of more potency are taken, we see in this work what powerful instruments may be wielded in a common weed or herb, whose greater or less activity still depends upon the quantity used, whether the principle be diffused through the plant or concentrated by chemical analysis; giving this advantage, however, in favor of the latter, that its results are less liable to be abused by the ignorant, and by those pretenders who scatter death through society by herbs and roots.

If physicians rely on the lancet, mercury, and other remedies of that class, it is because their own experience, as well as that of the many valuable men who have preceded them, have taught them that they can be and are relied on. Science, taught by the benevolence of universal nature, does not circumscribe itself to any one country for remedies, nor to any one class of re-

medies which she has spread abroad within our reach; nor does it call that foreign, although a foreign drug, which answers its purpose in relieving the sufferings of the animal system. The real inquirer after truth will explore nature throughout, nor leave any part of her works untouched in seeking remedies for disease, nor fear to make use of the faculties he finds implanted in him to search out by chemical analysis, or otherwise, the active principle contained in any remedial agent: he will consider the chemical laboratory as much a part of and within the province of nature as the field and the mountain; and as legitimately entitled to his use in supplying him with means against the pestilence, and to save his fellow beings from death.

The objection to these preparations on account of their price is one which is daily lessening, and which a wider use will continue to remove.

It must be recollected that the weights and measures in the body of this work are according to the French standard. Inattention to this has occasioned some misunderstanding respecting the power and value of some of the medicines. To guard against this, in future, I have given, in an appendix, tables of those weights and measures compared with those of the United

States, taken from the best authorities, it being considered preferable to giving them in the body of the work with every article.

I have also given formula for the preparations of each article mentioned in the work, that is used, equalized to our standard of weights, and doses calculated accordingly.

NEW YORK,
September, 1827.

NOTE. Since this work has been in the press, I have received information from Paris that a new article has been prepared in England, called *sulphate of jalap*, or *jalapine*, which Messrs. Pelletier and Caventou are about preparing, and will soon transmit to Messrs. F. & N. G. Carnes, of this city, when an opportunity will be afforded to make use of it. It will, in all probability, be useful as an aperient.

I have also procured through Messrs. Carnes, who receive the medicines prepared by Messrs. Pelletier and Caventon, some gum elastic setons, prepared in the same manner as the catheters of Bernard. They will, probably, prove highly convenient and useful.

FORMULARY

FOR THE PREPARATION AND EMPLOYMENT OF MANY

NEW MEDICINES.

RESIN OF NUX VOMICA.

In 1809 I presented to the first class of the Institute of France an experimental work, which has conducted me to an unexpected result; that is, that an entire family of vegetables (the bitter strychnos) has the singular property of exciting strongly the spinal marrow, without interfering, but in an indirect manner, with the functions of the brain. In finishing my paper, I announced that this result could be applied with advantage to the treatment of diseases.*

*"Medicine will draw, perhaps, the greatest advantages from the knowledge of a substance whose virtue acts specifically on the spinal marrow; for we know that many very severe diseases have their seat in this part of the nervous system. But the upas is not obtained in commerce; and, when even experience shall teach that this vegetable is a precious remedy, how shall we procure it? We must attempt new experiments, in order to find a substance whose effects shall be analogous to those of the upas."

It was in these experiments that we have, M. Delille and myself, found the properties of the nux vomica and bean of St. Ignatius, and proposed the medical employment of the resin of nux vomica. See Examination of the Action of some Vegetables on the Spinal Marrow, read at the Institute 24th April, 1809, by F. Majendie, M. D., aid in anatomy to the Faculty of Medicine of Paris.

This assertion, then conjectural, has for several years past been confirmed by many experiments made at the bed side. Dr. Fouquier published, some years since, several cases of cure of paralysis by nux vomica. I had myself made attempts, and obtained like success, before knowing that my brother member was occupied in the same researches; and I saw with pleasure that I was anticipated in the publication by a physician so generally esteemed.

However this circumstance did not relax my researches. I obtain excellent results from the employment of the alcoholic extract of nux vomica, not only in partial or general paralysis, but in many other sorts of debility of the economy, both general and local.

Preparation of the alcoholic extract of nux vomica. Take a determinate quantity of nux vomica rasped; exhaust it by alcohol of 40°, and, at the lowest possible temperature, renew it until nothing more is derived from the raspings; then evaporate slowly to the consistence of an extract.

Alcohol much more feeble might be used; but then a matter much less active will be obtained, because this alcohol dissolves a great quantity of gummy matter.

Dry alcoholic extract. Take alcoholic tincture, the most charged possible with nux vomica, made with alcohol at 36°. Filter and evaporate upon plates, as for the dry extract of cinchona.

Physiological properties. A grain of this extract, absorbed at any point of the body, or mixed with the food, causes quickly the death of a middling size dog, producing attacks of tetanus, which, by prolongation, impede respiration until complete asphyxia is produced.

When the dose is much stronger, the animal appears to perish by the same action of the substance on the nervous system, as M. Segelas has ascertained. (See my Journal of Experimental Physiology, October, 1822.) Dr. Defermon describes a sort of contraction of the spleen which takes place in animals poisoned by the alcoholic extract of nux

vomica. I have myself observed the same phenomenon. When an animal under the action of this substance is touched, he experiences a jerk similar to a strong electric shock. This effect is reproduced by every new contact.

The section of the spinal marrow behind the occiput, and even the complete beheading, does not prevent the effects of this substance from taking place, and even from continuing some time. This character distinguishes the action of the alcoholic extract of strychnos from that of all other substances at present known. The excitement of the spinal marrow is only transmitted to the muscles by the anterior roots of the rachidian nerves: the posterior roots have not the same property. (See Journal de Physio. Exp. tom. 3.)

After death, no lesion of the tissue, which can point out the cause which produces it, is to be found.

Action of the alcoholic extract on man in health. This is identically the same as that which has just been described; and, if the dose is carried high enough, death happens quickly with the same symptoms. The body offers likewise no apparent lesion of the tissue: nothing is observed but traces of asphyxia, which has produced or accompanied death. I ascertained this upon a woman after being poisoned.

Action upon man diseased. Upon a man affected with paralysis, the effects are similar to those described; but they have this very remarkable circumstance, that they are particularly exhibited in the paralyzed parts. It is there that occurs the tetanic agitation; it is there that a feeling of prickling announces the action of the medicine; finally, it is there that is developed a local perspiration which is not observed elsewhere. In hemiphlegias, submitted to the action of nux vomica, the contrast between the two halves of the body is striking: while the sound side is quiet the sick side experiences extreme agitation; tetanic spasms succeed one another rapidly, and a copious sweat appears. I have seen

upon one woman the affected side covered with an anomalous eruption: the opposite side did not offer the slightest trace. The tongue itself presents this difference between the two halves: one experiences often a bitter taste very evident, while the other offers nothing of the kind.

If the dose is carried further, the two sides participate, but unequally, in the tetanic effect, so much so that the patient is sometimes thrown out of bed, so intense are the tetanic paroxysms.

In a feeble dose, the alcoholic extract of nux vomica, like many remedies, has not any action which can be immediately recognized: it is only after a certain number of days that its advantageous or injurious effects can be appreciated.

Cases in which the alcoholic extract of nux vomica may be employed. These are all diseases of debility, either local or general; paralysis of all kinds, general or partial. Mr. Edwards cured with nux vomica an amaurosis with palsy of the upper eyelid. I have seen very good effects in marked debility of the organs of generation, incontinence of urine, &c. I have employed also the resin of nux vomica for feeble stomachs, and extreme general debility, with irresistible tendency to sleep. I have recently used it with advantage in several cases of atrophy of the superior and inferior extremities. It is not proper to give to patients the extract of nux vomica, strychnine, or brucine, but at a distant period from that at which the apoplexy took place which occasioned the paralysis; and cure is not obtained in these consecutive palsies, while there is cerebral organic lesion; for, while such lesion exists in any part of the brain having influence on the movements, the palsies which result are incurable, and it would be dangerous to persist in the employment of these remedies.

Dr. Chauffart (Journal General de Medicine, October, 1824,) gave 20 grains of the extract to a person, who had paralysis following apoplexy, without obtaining a cure; however the patient had very strong tetanic spasms in the para-

lyzed members, and the employment of the nux vomica was continued a long time in large doses. Otherwise, the efficacy of the extract has been confirmed in debilities of the nervous system by a great number of physicians. Since the publication of our last edition, there have been reported several cases of paralysis cured by the use of this remedy.

Dr. Chauffart has made known three other cases of palsy cured by the use of this extract; among others, a palsy of the rectum.

Dr. Baxter has also reported, in the 8th volume of the New York Medical Repository, a case of hermiphlegia which occurred in an infant three years and a half old, in consequence of measles. This paralysis was cured by the extract of nux vomica. A half grain was given to this child every four hours: the contractions produced by the medicine were universal; they took place on the healthy side and on the diseased side; and they lasted for one or two hours.

But one of the cases the most remarkable is recorded by Dr. Gendron, (Journal General de Medicine, November, 1824, page 171.) An individual, who had revelled in excesses of all kinds, was, in consequence of a fit of anger, seized with a paralysis of the left arm, without loss of sensibility. For some time this patient perceived numbness and pains in the abdominal parts; when finally, notwithstanding the most enlightened care, the muscular paralysis became almost complete, with entire preservation of the sensibility. The extract of nux vomica was then exhibited, and, during fifteen days, the patient took thirty-six grains every day, at three times: this dose was arrived at gradually: the cure was perfect. The only phenomena observed during this treatment were a very vivid tingling of the parts; a light agitation during several nights; the patient complained also of acute pains at times in the heels.

M. Cazenave, of Pau, has just employed with success the nux vomica in a case of the dance of St. Guy, (St. Vitus,) which had resisted all the usual means.

Mode of using the alcoholic extract of nux vomica. The preferable form for exhibiting this extract is that of pills, if it be wished to obtain the manifest effect, that is, the spasms. Each pill should contain one grain of extract; beginning with one or two, and increasing each day until the desired effect is obtained; then stopping to avoid accidents. It is best to give the pills in the evening, because the night is the best time to observe the phenomena which are to be produced.

Sometimes the dose must be carried to 24 or 30 grains a day, to obtain the tetanic spasms; but most generally 4 to 6 grains is sufficient.

If for any reason the use of the remedy is interrupted for several days, it is necessary to return to small doses, and not to take up the larger doses but by degrees.

When it is desirable to obtain the slight effects of the substance, a grain or half grain a day is sufficient quantity. An alcoholic solution may also be used, of which this is the formula:

Tincture of nux vomica.

Alcohol at 36°,	1 ounce,
Dry extract of nux vomica,	3 grains.

This tincture is administered by drops, in draught or the drinks, under the same circumstances as the alcoholic extract in substance. It may also be employed in frictions on paralyzed or emaciated parts. This last mode of using it is now much resorted to in Italy.

STRYCHNINE.

The alcoholic extract of nux vomica, the nux vomica in substance, the bean of St. Ignatius, the famous poison of Java (upas tieuta,*) the serpentine wood, owe their great activity upon man and other animals to two particular vegetable alkalies, which have been discovered by Messrs. Pelletier and Caventou. One is strychnine, the other brucine. The two bases are combined with a vegetable acid, which these authors have called igazuric. (Annals de Chim. t. x. p. 176, 1819.)

Preparation of strychnine. Make an alcoholic extract of nux vomica; dissolve it in water; add to the solution the liquid subacetate of lead until there is no more precipitate. The foreign matters being thus separated, the strychnine remains dissolved, with a portion of coloring matter, and sometimes an excess of acetate of lead. The lead is separated by sulphuretted hydrogen; filter and boil with magnesia, which combines with the acetic acid and forms a pre-

*The poison mentioned here is the upas tieuta, which must not be confounded with the upas anthiar, a poison equally terrible collected in the same country, from a large tree of the family of Urticees: this vegetable forms a kind of new species, under the name of Anthiares Toxicaria (Leschenault.) The upas anthiar kills in a few minutes by vomiting, while the upas tieuta causes death by tetanus. It is to Messrs. Pelletier and Caventou that we are indebted for what we know of the chemical composition of the upas anthiar. These chemists have extracted a salt with a vegetable base, which, injected into the pleura of a dog, produced death in a few minutes. The physiological experiments which have been made on this subject confirm those we made twelve years ago. (See Annals de Chemie and Physique, vol. 26, page 44; Memoire de M. M. Pelletier and Caventou, entitled, Examen Chimique des Upas.)

cipitate of strychnine and brucine. Wash with cold water; redissolve in alcohol to separate the magnesia added in excess, and, by evaporation of the alcohol, a mixture of strychnine, brucine, and coloring matter is obtained. Macerate the whole in a small quantity of weak alcohol, which soon dissolves the brucine and coloring matter. The strychnine remains in form of powder; take it up by boiling rectified alcohol, and the strychnine crystallizes. It is necessary to leave a little alcoholic mother water, to retain the remains of the brucine.

By renewing the crystallization of the strychnine, it is obtained purer still. But it is almost impossible, with the nux vomica, to have strychnine which will not redden by the nitric acid, which is the characteristic sign of its purity. But it is closer approximated to with the bean of St. Ignatius; and it is easily obtained in using the upas tieuta.

Physical and chemical properties. The strychnine obtained by crystallization in an alcoholic solution, diluted with a small quantity of water and left to itself, is presented under the microscopic form of crystals acknowledged for prisms of four sides, terminated by pyramids of four elliptical faces. When crystallized rapidly, it is white and granulated; its taste is of an insupportable bitter; the after taste produces a sensation which may be compared to that produced by certain metallic salts; it has no smell. Exposed to the contact of the air, it undergoes no alteration. It is neither fusible nor volatile; for, submitted to the action of caloric, it melts only at the moment at which it is decomposed and carbonated. The degree of heat at which its decomposition takes place is even inferior to that at which are destroyed most vegeto-animal matters. Warmed at an open fire, it smells, blackens, gives out empyreumatic oil, a little water, and acetic acid; some traces of carbonic acid gas, carbonated hydrogen, and carbonate of ammonia. Distilled with the deutoxide of copper, it furnishes much carbonic acid and azote.

According to Messrs. Dumas and Pelletier, the mean between two analyses of strychnine gives, for a hundred parts, (See their Memoir on Organic Salifiable Bases,) carbon, 78, 22; azote, 8,92; hydrogen, 6,54; oxygen, 6,38—total, 100, 06. It is therefore composed of oxygen, hydrogen, carbon, and azote.

Notwithstanding its strong taste, strychnine is almost insoluble in water: 100 grammes of water, (15,45-100 grs.,) at the temperature of 10°, (55° Fah.,) dissolve only grains 0, 015; it requires, then, 6,667 parts of water to dissolve it at that temperature. Boiling water dissolves a little more than double: 100 grammes of boiling water dissolve grains 0,04: it is then soluble in 2,500 parts of boiling water. One remarkable thing is, that a solution of strychnine, made cold, and consequently containing only 1-6000 of its weight, could be diluted with 100 times its weight of water, and yet preserve a very remarkable bitter taste. Finally, the principal character of strychnine consists in the property it has to form neutral salts in uniting itself to acids.

The process given above, according to the late observations of Messrs. Pelletier and Caventou, shows that the nux vomica contains two alkaline substances: one the strychnine, of which mention is just made; the other, the brucine, already found in the false angustura by the same chemists, and of which we shall soon speak. In following this process, it is necessary, as has been said, to crystallize this substance in alcohol several times: then it is pure, and deprived of brucine: this last being much more soluble in alcohol, and crystallizing with difficulty, remains in the alcoholic mother waters. Otherwise, the presence of brucine with strychnine could not be of great inconvenience, for brucine has qualities analagous to strychnine; it is only less energetic.

M. Henry, chief of central pharmacy, has given a new process for extracting the strychnine. It consists in boiling nux vomica in water; in evaporating the liquors to the consistency of syrup; in then adding lime, which takes away the acid and

leaves the strychnine uncombined. This is separated from the lime by means of alcohol. The strychnine, dissolved in alcohol, is then obtained from its solvent by evaporation. To obtain it more pure, it is dissolved anew in alcohol, and is crystallized a second time.

M. Henry gives another mode of purifying strychnine: it consists in combining it with nitric acid. The salt is then crystallized, after being tinged by the animal carbon; finally, the strychnine is precipitated by ammonia. We should observe, that, at the time when M. Henry published his procedure, it was not yet known that the brucine existed in the nux vomica; so that, in the exposition of this process, no mention is made of the separation of the two alkalies; but it is easy to see that, every time that the strychnine is obtained by crystallization, it will be exempt from brucine, or at least will contain but little; while, obtained by precipitation, it will be much mixed with brucine, and consequently will have less effect on the animal economy.

It is unfortunate that the bean of St. Ignatius should be so rare in commerce; for this seed, containing strychnine almost exempt from brucine, as Messrs. Pelletier and Caventou have proved, possesses great advantage in using it to obtain pure strychnine.

Action of strychnine upon man and other animals. The mode of action of strychnine is entirely similar to that of the alcoholic extract of nux vomica, only it is much more energetic. An eighth of a grain is sufficient to kill a dog of common size: upon a healthy man, a quarter of a grain has often very evident effects.

Cases in which the strychnine should be used. The cases which require its use are the same which have been pointed out for the nux vomica. We could even forbear from resorting to the strychnine, if the extracts of nux vomica were always made in the same manner, and if they were not subject to vary in strength according to the process followed for their preparation. I think, then, it is preferable, in general,

to replace it by the strychnine, by reason of the constancy of its properties and uniformity of its action. I have constantly obtained as good effects from it as from the extract of nux vomica.

M. Theophilus Cramer, of Bonn, has published a memoir, entitled, "Strychnii vis a efficacia in Corpus Animale," which proves that the employment of the new remedies has also spread in Germany. M. Diffenbach has employed with success the strychnine in a case of paralysis.

Dr. Anthony Cattaneo, who has translated into Italian our Formulary, has also published a memoir upon strychnine. It is found inserted in the 32d number, page 236, of the Journal of Dr. Omodei, (Annali Universali di Medicina,) under the title of "Della Strychnina, nuovo alcali vegetale ritrovato nella fave di sant' Ignazio, (strychnos ignatia,) nella voce vomica, (strychnos nux vomica,) e nellegro colubino, (strychnos colubrina,) de suoi effeti sull' economia animali."

Manner of employing the strychnine. Pills may be used containing one twelfth or one eighth of a grain of this substance. The following formula may be used:

Pills of strychnine. ℞ Strychnine, very pure, 2 grains,
Conserve of roses, 1-2 gros.

Mix exactly and make into 24 equal pills well silvered, so that they may not run together. [It is better to roll them in magnesia, flour, or powdered liquorice.]

Tincture of strychnine. ℞ Alcohol at 36°, 1 ounce,
Strychnine, 3 grains.

This tincture is given by drops, from 6 to 24, in draughts or drinks.

I have often used the following draught:

Draught of strychnine. Distilled water, 2 ounces,
Strychnine, pure, 1 grain,
White sugar, 2 gros,
Acetic acid, 2 drops.

Two tea spoonfulls morning and evening.

Salts of strychnine. In uniting itself to acids, strychnine forms crystallizable salts, and for the most part soluble. It is necessary, therefore, to recollect the great solubility of these salts, when strychnine is mixed in the draughts, or when the drinks are given to the patient; thus lemonade and all acid substances promote the effect of strychnine. The subcarbonate of strychnine is very little soluble.

We will say a word of these salts, because it is necessary that the physician should know their properties, in order to recollect them in prescribing:

Sulphate of strychnine. This salt is soluble in less than 6 parts of cold water: it crystallizes in small diaphanous cubes, if it be neutral, and in needles, if acid. The taste of this sulphate is extremely bitter. It is decomposed by all the soluble salifiable bases. This salt is not altered by exposure to the air: heated to the temperature of 100°, (212,) the sulphate experiences no reduction of weight, but becomes opake. It melts at a higher temperature, and is found in bulk with a loss of three per cent.; the heat being prolonged, it is decomposed. It is composed of 9,5 of acid, to 90,5 of strychnine, in the 100. According to Messrs. Dumas and Pelletier, in the memoir cited, 100 parts of the base saturate 10,486 of acid.

The hydrochlorate of strychnine is yet more soluble than the sulphate; it crystallizes in needles, which, examined by the glass, appear to be quadrangular prisms; heated to the temperature at which the base is decomposed, it disengages muriatic acid.

The phosphate is not obtained perfectly neutral, but by double decomposition it crystallizes in prisms of four sides.

The nitrate of strychnine is obtained by dissolving the strychnine in the acid much diluted. By evaporation it crystallizes in pearly needles. This salt is much more soluble in warm water than in cold. Its action is much more violent than that of strychnine.

The acetic, oxalic, and tartaric acids form, with strychnine, very soluble salts, susceptible of crystallizing, especially if the

acid predominates. The neutral acetate is, moreover, very soluble, and with difficulty crystallized. The hydrocyanic acid forms also with this base a crystallizable salt.

The subcarbonate is obtained in white flakes, and is, we have said, very little soluble.

Iodate and hydriodate of strychnine. The strychnine boiled with iodine is dissolved, and forms an iodate and hydriodate of strychnine. A large proportion of acid, combined with a very small quantity of strychnine, will form a remedy which will possess the double property of acting on the organs of nutrition and exciting the nervous system.

The salts of strychnine are more active, and consequently more poisonous, than the base, because of their great solubility. It would, however, be more advantageous, in some cases, when the patient is used to the action of strychnine, to substitute the salts for the base, without augmenting the dose.

BRUCINE.

This salifiable organic base was discovered, in 1819, by Messrs. Pelletier and Caventou, in the bark of the false angustura, in which it is combined with the gallic acid, in the state of an acid gallate, (brucea antidysenterica.) Those chemists have found it since associated with strychnine in the nux vomica.

In the bean of St. Ignatius, and in the upas, the brucine plays the same part with regard to the strychnine which the cinchonine does to the quinine. The cinchona the most active contains the most quinine; so the bean of St. Ignatius, and the upas tieuta, much more active than the nux vomica, contain little brucine and much strychnine. Strychnine is almost pure in the upas.

Preparation of brucine. It is extracted from the bark of the false angustura, by a similar process to that which is pointed out for the extraction of strychnine, with this difference, that it is necessary here to wash the magnesian precipitate much more, because the brucine is much more soluble in water than strychnine, and on account of the great quantity of coloring matter which it carries with it. By evaporation of the alcoholic liquors which have served to treat the magnesian precipitate, the brucine is consequently obtained in a resinous form, because it is not yet sufficiently pure to crystallize. To purify it, it is necessary to combine it with oxalic acid, and treat the oxalate with a mixture of alcohol at 40° and ether at 60°. The coloring matter will thus be dissolved, and the oxalate of brucine will remain in the form of a white powder: this oxalate should then be decomposed by magnesia, and the brucine taken up by alcohol. In evaporating the alcoholic solution in the open air, the brucine is obtained crystallized: if it is evaporated by the aid of heat, the brucine is obtained melted, but not less pure.

Properties of the brucine. It has a very intense bitter taste. It is not very soluble in water, although more soluble than strychnine. It is soluble in 500 times its weight of boiling water, and 850 times the same weight of cold water. When it has crystallized regularly, it is presented in the form of oblique prisms, with parallelogramic base. The crystallized brucine is a true hydrate: its affinity for water is very considerable, while pure strychnine is not susceptible of becoming a hydrate.

The brucine loses by fusion a considerable quantity of water. 200 parts of brucine crystallized in water give, residue 134 parts, water 37; 161 parts of brucine crystallized in alcohol give, residue 134 parts, water 27; which establishes for the constitution of the hydrate, taking the mean between the two results, 100 parts of brucine to 21,65 of water.

It melts at a temperature nearly equal to that of boiling water, and by cooling congeals like wax. It unites to acids, and forms with them neutral salts, the most of which are susceptible of crystallizing regularly. When they are put in concentrated nitric acid, they acquire a more intense crimson color: by heating, the color changes to a yellow. If, in this state, a proto-hydrochlorate of tin is poured upon them, a superb violate precipitate is produced: this character belongs only to the brucine.*

Two analyses of the brucine, extracted from the false angustura in the state of perfect purity, and melted in vacuo, give as a mean of composition, (see the memoir,) carbon, 75,04; azote, 7,22; hydrogen, 6,52; oxygen, 11,21—in 100 of brucine.

* Strychnine taken from nux vomica, treated by the same means, takes sometimes a violet tint. In this case we may be assured that it contains brucine; for the strychnine of the bean of St. Ignatius, and even that of the nux vomica, perfectly purified, do not produce the violet color by the proto-hydrochlorate of tin. Besides, strychnine quite pure does not redden by the action of nitric acid.

Action on the animal economy. This action is analogous to that which the strychnine exercises, but is less energetic: the intensity appears to us, by some experiments, to be to that of pure strychnine as 1 to 12.* It required 4 grains of brucine to kill a rabbit. A middling size dog having taken 4 grains of brucine, had strong attacks of tetanus, but did not die. The brucine could then replace the strychnine: it has the advantage then of producing analogous effects, without the inconvenience of so great activity.

Manner of employing the brucine. It may be used like the strychnine, in pills or in tincture, gradually increasing the dose. For medical purposes, that extracted from the bark of the false angustura should be used: that taken from the nux vomica is too apt to be mixed with a certain quantity of strychnine, which increases its energy and prevents our calculating the effects.

Cases in which the brucine should be employed. Since the brucine possesses the same properties as the strychnine, but in a less degree, it may be administered in the dose of one, two, or three grains without the fear of accidents, in the same circumstances in which the preparations of nux vomica are indicated. It is probable even that this dose may be carried much higher, but it is better to use a wise precaution.

M. Andral (son) has used with advantage the brucine, from 1-2 a grain to 5 grains, on several persons affected with paralysis. (See my Journal of Experimental Phisiology, for July, 1823.) I have myself given the remedy in two cases of atrophy, one of the arm and another of the leg. The patients took six pills of 1-8 of a grain daily.

* Dr. Andral (the son) has just made new comparative experiments on the brucine and strychnine. He has arrived at this result: that it requires 6 grains of brucine to produce the effects of a grain of impure strychnine, and of a quarter of a grain of pure strychnine. The difference of action, then, must be greater than what was first estimated.

Brucine pills. ℞ Brucine, very pure, 12 grains,
Conserve of roses, 1-2 gros.
Mix exactly, and divide into 24 equal pills.

Tincture of brucine. ℞ Alcohol at 36°, 1 ounce,
Brucine, 18 grains.
This tincture may be given in drops, from 6 to 24, in a draught or drinks.

Stimulant draught. ℞ Distilled water, 2 ounces,
Pure brucine, 6 grains,
White sugar, 2 gros.
A table spoonfull morning and evening.

Salts of Brucine. Brucine, in combining with acids, forms neutral and acid salts.

Sulphate of brucine. This salt crystallizes in long needles, which resemble prisms with four faces, terminated by pyramids of extreme fineness. This salt is very soluble in water and alcohol. Its taste is very bitter. It is decomposed by potash, soda, ammonia, barytes, strontian, lime, magnesia, morphine, and strychnine.

The acid sulphate crystallizes more easily than the neutral sulphate. It is composed of sulphuric acid 8,84—5 to brucine 91,16—51,582.

Muriate of brucine. This salt crystallizes in prisms of four faces, terminated by an oblique surface. It is unalterable by the air, and very soluble in water. The sulphuric acid decomposes it; the nitric alters and even destroys the brucine. The muriate consists of acid 5,953—4,575 to brucine 94,046—72,5.

The phosphate of brucine crystallizes also. It is very soluble and lightly efflorescent. The acetate, tartrate, and oxalate also crystallize. As to the nitrate, it is a mass having the appearance of a gum. The sulphate and muriate of brucine, being more soluble than their base, present some advantages, and probably have more activity: they may take the place of brucine in the formula we have given.

MORPHINE
AND
SALTS OF MORPHINE.

Nothing shows better the importance of the science of medicine, named so singularly materia medica, than the history of opium. By turns, proscribed as eminently injurious, or extolled for a panacea; these assert that it calms and procures sleep, those swear that it is always exciting; less exclusively, another distinguishes its stupifying, soporific, acrid, and calming properties. Starting from this last point, the chemists of the last age have endeavored to find in the different principles the different properties of opium. Besides, physicians, the most celebrated, have not disdained to attach their name to some preparation of opium, which they have regarded as preferable to all others. But where are the facts on which reposes the renown of the laudanum of Sydenham, the drops of Rousseau, the tinctures of opium, the syrups of poppies, the resinous and aquious extracts, &c. &c.? Upon what motive does a practitioner always employ any of these preparations, while he excludes all others?

The sciences support and aid one another mutually: it would be impossible to issue from those uncertainties without the recent improvement in chemical vegetable analysis, and without the happy applications which have been made of it to opium.

It results from the labors of chemists, in this respect, and particularly from the researches of Messrs. Derosne, Sertuerner, Robiquet, and Robinet, that opium is composed, 1st, of a fixed oil; 2d, of a matter resembling caoutchouc; 3d, of a vegeto-animal substance, which has not been sufficiently studied; 4th, of mucilage; 5th, of fecula; 6th, of resin; 7th, of the remains of vegetable fibre; 8th, of narcotine; 9th, of

meconic acid;* 10th, of the acid meconate of soda; 11th, of the codate of morphine. The codate of morphine is a salt which M. Robinet has discovered in opium, and which is the result of the combination with morphine of an acid which M. Robiquet had before indicated. M. Robinet has just studied the properties of this acid, and the name of codic has been given to it, from the Greek word κοδη, which signifies fruit of the poppy.

After these researches, all recent, and yet unfinished, of M. Robinet, and one part only of which has been communicated to the Academy of Medicine, we might believe at once of the existence of a cyanure of morphine in opium, on account of the blue color which this chemist has found that morphine itself, and its combinations, give to the solutions of the salts of iron at its greatest oxidation; but it is certain now that this character belongs to morphine, and offers a mode of recognizing its presence in any case where this vegetable base is suspected of being the cause of poisoning. The new process which M. Robinet has employed to analyze opium consists in the employment of solutions of neutral salts, which have the property of dissolving almost pure the natural salt of morphine (the codate) without taking up the resinous matter: by evaporating these solutions, and treating with alcohol the saline mass which remains, the salt of morphine is obtained with facility. A solution of muriate of soda, marking 15° by the hydrometer of Beaume, has especially succeeded.

Preparation of morphine. To obtain it, M. Robiquet employs the following method: he boils a very concentrated solution of opium with a small quantity of magnesia, (10 grains to a pound,) and continues the boiling about a quarter of an

* M. J. Fenoglio has just published a note on the action of the meconic acid, and its combinations, upon man and upon beast. It seems to result, from these experiments, that the meconic acid does not possess the febrifuge property which is attributed to it. (Annali Univers, di Medicina, Oct. et Nov., 1823.)

hour. A grey deposit, quite large, is formed, which is filtered and washed with cold water. The precipitate, well dried, is treated with weak alcohol, which is left to macerate with heat some time, without raising it to boiling. He thus takes away a very little of the morphine and much of the coloring matter. He filters and washes with a little cold alcohol. The deposit is then taken up by a large quantity of rectified alcohol, which is then raised to boiling and kept so. The liquor, while boiling, is then filtered, and by cooling it the morphine is obtained, which is deprived of its coloring matter by repeated crystallizations.

Mr. Thompson has published (Annals of Philosophy, June, 1820) the elementary composition of morphine: he has made known, at the same time, a method, which appears to him easy, for procuring this base in a state of purity. He precipitates a strong infusion of opium with caustic ammonia; separates by means of the filter the light brown precipitate which is formed; evaporates the infusion to the sixth of its volume, and mixes with it a fresh quantity of ammonia: he obtains by that a fresh precipitate of pure morphine. He lets a deposit form, which is received on a filter and washed with cold water, when it is well drained; he sprinkles it with a little alcohol, and lets the alcoholic liquid pass through a filter: this fluid carries off a large part of the coloring matter, and likewise a small portion of morphine. He then dissolves the morphine in acetic acid, and, in order to render the solution colorless, he treats it with a little ivory black. This mixture is agitated frequently for twenty-four hours, and it is then thrown upon a filter. The liquor passes into a vessel entirely without color; he then treats it with ammonia, and the morphine is deposited in the form of a white powder. If, then, this base is dissolved in alcohol, and the solution left to evaporate spontaneously, the morphine crystallizes in form of handsome regular crystals. These crystals are of a perfect white, and a transparency lightly opaline, entirely deprived

of odor, but of a bitter taste, and representing rectangular prisms with four faces.

M. Bussy, assistant to the school of pharmacy, has given a good analysis of morphine, in which he has met with azote, which M. Thompson did not suspect, but the presence of which M. Dulong had made known in an analysis anterior to that of M. Bussy, and a much greater proportion of carbon. Messrs. Dumas and Pelletier (in their memoir) have made two analyses of morphine: the first morphine was extracted from opium, according to the process of M. Robiquet; the second was obtained from the sulphate of morphine by potash. They found, as a mean composition, a result which does not much approach that of M. Bussy, as regards the proportion of carbon and oxygen.

Analysis of M. Bussy.		*Analysis of Dumas and Pelletier.*	
Carbon,	69,0	Carbon,	72,02
Hydrogen,	6,5	Hydrogen,	7,61
Azote,	4,5	Azote,	5,53
Oxygen,	20,0	Oxygen,	14,84
Morphine,	100,0		100,00

Mr. Brandt has lately given the analysis of several vegetable alkalies. (Annals of Philosophy, April, 1824.) He found the mean proportion of morphine as follows: carbon, 72; azote, 5,5; hydrogen, 5,5; oxygen, 17—total 100.

Action of morphine on man and on other animals. The pure morphine, being but little soluble, does not easily make apparent what is the narcotic part of opium; however, there now remains no doubt in this respect: direct experiments have often demonstrated it to me. If, for example, a solution of morphine in oil is made use of, the narcotic effects are obtained very decidedly, even in a feeble dose, such as a quarter or half grain; but it is especially when the morphine is combined with acids that it manifests its narcotic effects, probably because salts of morphine are much more soluble than morphine itself. [We may thus account for the various

and variable effects of opium on different persons. It is well known that other medicines operate differently, according to the state of the digestive organs; thus acids existing in the stomach, by decomposing the natural salt of morphine, may alter its powers and qualities; or an alkaline state, by also decomposing that salt, and leaving the morphine uncombined, may, by its little solubility, diminish its effect, and disappoint us in our object. *Trans.*]

It is now nearly five years since I employed, for the first time, the acetate, the sulphate, and hydrochlorate of morphine as remedies. I have ascertained that these salts possess all the advantages which are desired from opium, without its inconveniences. (See New Journal of Medicine, Paris, 1818.) My first attempts having discovered to me the hydrochlorate as less advantageous than the acetate and sulphate, I discontinued my researches on that salt: perhaps it may be well to resume them.

Preparation of the acetate of morphine. This salt is formed by combining directly in a dish the acetic acid and morphine, and then letting it slowly evaporate to dryness. The difficulty of obtaining it crystallized, by reason of its extreme deliquesence, has conduced to this mode of preparation.

The acetate is also prepared by dissolving the morphine in alcohol, then filtering the solution. The liquor is saturated with acetic acid and evaporated, so as to reduce the whole to dryness; but the acetate thus obtained is not exactly the acetate of morphine, but rather an acetate containing an excess of base, which may be perceived by dissolving in water: one part of the acetate is not dissolved; it is the morphine, which is not entirely saturated with acetic acid. However, this effect may take place with the acetate perfectly neutral, because this salt has the property, as soon as it comes in contact with water, to divide into two salts: the one with excess of acid, and soluble; the other with excess of base, and insoluble.

This effect, joined to the difficulty of obtaining the acetate quite neutral, ought to induce a preference to the sul-

phate of this base, which does not present near this inconvenience.

The acetate may, however, be obtained crystallized: for that purpose, when the morphine is dissolved in alcohol, and it is saturated with acetic acid, it is to be filtered and left to evaporate slowly in a dish covered with gauze; the acetate of morphine crystallizes, and is deposited on the sides of the dish in form of ramifications.

Preparation of the sulphate of morphine. The morphine is dissolved by sulphuric acid, which must previously be diluted with water. The solution, warmed and evaporated to a certain point, is crystallized by cooling on threads of silk. This salt resembles very much the sulphate of quinine, with which it may be confounded; but it becomes red when it is treated with concentrated nitric acid; a phenomenon which the sulphate of quinine does not offer.

To obtain the sulphate of morphine, the morphine may also be dissolved in alcohol, and saturated with sulphuric acid; evaporated and the sulphate obtained in a crystallized state, also, on threads of silk.

M. Pelletier thinks that the sulphate of morphine is to be preferred to the acetate, because it is possible to obtain it always the same, which is not the case with this last salt, which is often mixed with narcotine, because this last is more soluble in alcohol than morphine. It happens, also, that the acetate is in part decomposed by dessication, which it is obliged to undergo to preserve it. As the sulphate is always obtained by crystallization, the subsulphate is not formed, which may happen when it is evaporated to obtain the acetate.

The sulphate of morphine is soluble in twice its weight of distilled water. It is formed of acid, 22 or 5; morphine, 40 or 9,09; water 38.

Of the employment of the salts of morphine. I have endeavored, in the officinal preparations of the salts of morphine, to approach as near as possible to the preparations of

opium the most used; and I at first composed a syrup of morphine according to the following formula:

Syrup of morphine.

℞ Syrup of sugar, perfectly clarified, 1 pound,
Acetate of morphine, 4 grains.

This forms a syrup which may replace the syrup of diacodium, with much advantage, as that may be said to be arbitrary.

The syrup of morphine is at present generally used in Paris. Its dose is two tea spoonfulls every three hours. Sleep is often procured with a much smaller quantity; for instance, two tea spoonfulls only, in a little warm water, on going to bed.

Syrup of sulphate of morphine is made with the same proportions and taken in the same dose as that of the acetate.

I employ this syrup when the patients are accustomed to the action of the acetate syrup. In general, by varying the alkaline salts of medicines, their action on the animal economy is sustained for a long while, and without increasing the dose.

Solution of morphine.

℞ Acetate of morphine, 16 grains,
Distilled water. 1 ounce.

Add acetic acid 3 or 4 drops, alcohol 1 gros, in order to keep the salt dissolved.

This solution is used in drops, which may replace the liquid laudanum, the drops of Rousseau, the tincture of opium, &c. The dose of these drops is from 6 to 24.

The solution of morphine may be made by using the sulphate of morphine instead of the acetate.

Besides, the acetate and the sulphate of morphine may be used in pills, in powder, in draught, in julcps, in dose of a 1-4 of a grain to 1 grain in twenty-four hours. I have employed them, both in hospital and private practice, even to 4 grains a day, without any inconvenience.

It is necessary to repress very much the ideas which were at first formed respecting the activity of this remedy; and,

moreover, it is necessary to guard against viewing it as a very subtle poison: on the contrary, it is now without doubt that, to become deleterious, it must be administered in a large dose, and that it should excite vomiting. This last circumstance must be very rare.

Solution of citrate of morphine. The black drop has been used for a long time in Europe, particularly in England, and in the United States, where they are in great vogue. They are prepared in different ways; but all agree in combining a vegetable acid, generally impure, with opium. The two acids most commonly employed are the citric and acetic. To this mixture is added some aromatic substance, and a little sugar or honey.

The physicians who have made use of these preparations in their practice, pretend that they do not irritate the stomach, nor cause headache, vertigoes, nausea, &c.; finally, that they are deprived of the exciting properties of opium.

Dr. Porter, of Bristol, has introduced into practice a preparation which seems to offer the advantages of that which we have formerly spoken of, without the inconveniences. He has given to it the name of liquor of the citrate of morphine.

Mode of preparation. Take of opium 4 ounces, of crystals of citric acid 2 ounces; bruize them together in a porcelain mortar; add one pint of distilled water boiling; mix intimately; leave it to macerate for twenty-four hours, and filter.

Dr. Porter (see Monthly Journal of Medicine, p. 123, of New York) gives to this compound the name of citrate of morphine, because he supposes that it is entirely composed of citric acid combined with the alkali of opium. But it is evident that this preparation contains both morphine and narcotine. It should be made of pure morphine or extract of opium deprived of narcotine: and we shall then have a preparation which will approach the citrate nearer, and which will be less exciting and more truly narcotic.

Mode of action, and cases in which it may be employed. The American physicians have employed with advantage the preparation indicated by Dr. Porter. Its effects, they say, are more prompt, but less permanent, than that of the opium in substance or in tincture. They regard this solution as more active than opium. One part of this liquor of citrate of morphine equals about three parts of opium, in cases where a small quantity is sufficient to produce the effect; but when it is necessary to give large doses, it is necessary to calculate upon a double activity. It is necessary to avoid giving, at the same time with this preparation, either lime water or water of ammonia, because there is always excess of acid. In fact, all the alkaline carbonates.

The liquor of tartrate of morphine enjoys the same advantages as the citrate.

The citrate of morphine acts ordinarily as a narcotic in about ten minutes. Some physicians think that they do not succeed so well with the citrate of morphine as with the other preparations of opium, in arresting the dysenteric flux.

The following is the formula which we propose to substitute for that of Dr. Porter:

Solution of citrate of morphine.

℞ Pure morphine, 16 grains,
Crystallized citric acid, 8 grains.

Dissolve both in distilled water, 1 ounce; and color with the alcoholic tincture of cochineal, 2 gros.

This solution is employed by drops. It is given from 6 to 24 in twenty-four hours.

EXTRACT OF OPIUM,

DEPRIVED OF

MORPHINE.

By the operation just described in the article Morphine, the opium is not entirely deprived of this alkali: there remains always in the residue a certain quantity. M. Robiquet having mentioned this fact to me, I wished to see if I could reap some advantage from a matter regarded as useless, and abandoned as such by chemists.

I have remarked that the residuum we have spoken of possessed still a certain narcotic property upon animals, and upon man, much less marked, it is true, than that of the ordinary aqueous extract, but sufficiently decided to be of some utility in practice.

This extract may be given by grains. It appears to me that 4 grains do not equal in activity 1-4 of the common watery extract and 1-4 of a grain of morphine.

The extract of opium deprived of morphine should be found with all apothecaries who prepare their own morphine.

[As the quantity of morphine in this extract, besides its possessing narcotine, will always vary, it must not only be a useless but a dangerous medicine, since there will always be an uncertainty in exhibiting it in practice.—*Amer. Trans.*]

NARCOTINE,
OR
MATTER OF DEROSNE.

The researches which I have made upon this substance have not induced me to consider it as a medicine. I shall give here, however, in a few words, its physiological history, solely because it is one of the immediate principles of opium, and that there has reigned, and still continues to reign, much uncertainty on the subject.

Given in a feeble dose, (1 grain,) and dissolved in oil, narcotine produces upon dogs a state of stupor which persons not accustomed to experiments might easily confound with sleep: however this state evidently differs from it: the eyes are open, the respiration is not deep as in sleep, and it is impossible to rouse the animal from this dull and immovable state. Death occurs ordinarily in twenty-four hours.

Combined with acetic acid, the effects are entirely different: the animal can support strong doses (24 grains) without perishing; and while they are under the influence of this matter, they are agitated by convulsive movements similar to those produced by camphor; there are the same signs of fear, the same movements backward, the same impossibility to go forward; finally, the same foaming at the mouth and the same agitation of the jaws, &c.

I have united the action of morphine with that of narcotine, and I have seen that the two different kinds of effects of these substances may take place at the same time in the same animal.

I have put, for example, under the pleura of a dog, a solution of a grain of morphine and a grain of narcotine, both dissolved in acetic acid. The animal did not fail to show somnolency, and even, for some moments, true sleep, which the morphine produced; but, at the same time, the stimulant

effects of the narcotine (the acetate) were evident, and seemed to contend in a very singular and very remarkable manner with the effects of the morphine. This kind of combat lasted more than half an hour; but finally the animal slept profoundly, probably under the sole influence of the morphine. Does it not appear probable, from this experiment, which I have varied in several ways with analogous results, that it is to the presence in opium of two principles so opposite that its variable effects are owing? This appears to me so much the more probable, since the persons who take morphine do not recognize the exciting property which they distinguish very well in the aqueous extract of the apothecaries, or is found at the same time in narcotine and morphine.

Messrs. Dumas and Pelletier have found narcotine composed as follows: carbon, 68,88; azote, 7,21; hydrogen, 5,91; oxygen, 18—total 100.

[These facts before us offer strong objections to those preparations of the black drop which contain more or less acetate of narcotine; besides, they show the decided superiority which morphine must have over all the preparations of opium. In using morphine or its salts, we know what we are giving, and how much we may give; but, in using opium or its preparations, we may be giving narcotine, the effects of which are described above, when we should be giving morphine, as we know not what difference may exist in the different kinds of opium used, nor the proportions of morphine and narcotine different parcels of it may contain. These considerations may account for the different reports and the different prejudices existing for and against opium.—*A. T.*]

EXTRACT OF OPIUM,

DEPRIVED OF

THE MATTER OF DEROSNE.

The experiments which I have made on the matter of Derosne having shown me that this substance is injurious when it is not united to an acid, and that it is very stimulant when so combined,* M. Robiquet has had an idea of preparing an extract of opium entirely deprived of it, which has a marked advantage over the ordinary aqueous extract. For that purpose, he treats the ordinary aqueous extract with ether, and takes away by this reagent all the matter of Derosne. However, we owe it to truth to say, that many years before M. Robiquet, without however having the same end in view, M. Limousin Lamotte prepared the aqueous extract of opium, so purified by ether.

Mode of preparing the extract of opium deprived of narcotine. Macerate in cold water opium coarsely cut up; filter and evaporate to the consistence of a thick syrup; treat it in a convenient vessel with rectified ether; agitate frequently previous to decanting the ethereal tincture; after having separated it submit it to distillation to draw off the ether; repeat this operation as long as crystals of narcotine remain after distillation. When the ether is without action, evaporate the solution of opium to a pilular consistence.

M. Dublanc, jun., being convinced by repeated experiment that opium, treated by cold ether until that liquor has no more action upon it, furnishes an extract which, submitted

* This last fact has been recently contested by M. Orfila. I know not what has prevented him from arriving at the same results as myself; but I certify to the correctness of the fact which I have advanced. I offer to show to M. Orfila, when he wishes it, the phenomena which he doubts.

to the same agent hot, gives still some evident traces of narcotine, has modified as follows the process of M. Robiquet:

Take 300 grammes of the extract of opium prepared cold, which is to be dissolved in 150 grammes of distilled water; pour this solution into a matrass, and upon it 2000 of pure ether; set up the apparatus to collect the product of the distillation, and heat slowly. After having drawn off about 500 grammes of ether, the apparatus is taken down and the ether quickly decanted which floats on the extract in the matrass. The ether obtained by distillation serves to wash the extract while warm; and, after these operations, evaporate to proper consistence. For fear that the ether decanted from the extract after distillation might leave in the mass a little narcotine, the extract is dissolved in distilled water, filtered, and on the filter are found small crystals of narcotine, mixed with a pulvurulent extractive matter, insoluble in the small quantity of water employed to take up the extract: evaporate, to reduce the extract to ordinary consistence. Thus obtained, the extract of opium may be regarded as purged of narcotine. It attracts strongly the humidity of the air. It is easily dissolved in water, which it colors much less than the ordinary extract, without depositing any foreign matter.

A digester may be used, quite as well, to obtain the pure extract by ether.

Action on the animal economy. This extract is employed as the aqueous extract of the shops. I have tried it, thus deprived, on animals: it has appeared to me clearly narcotic, and to have an action entirely similar to morphine, but more feeble. I have also employed it in my practice with advantage, particularly on a young Greek physician, of the highest expectation, and who did not find himself well from the ordinary aqueous extract of the shops.

This new preparation it appears to me right to be recommended to physicians.

[I have lately used the acetate of morphine with good effect in dysentery: the pain of tenesmus was allayed, the complaint

in some measure checked, and sleep produced. I have been, however, considerably disappointed in a case where effects were produced which I must leave to Mr. Majendie to explain. I gave to a gentleman, laboring under continued and troublesome general irritation of the system, 1-2 a grain of acetate of morphine prepared by Messrs. Pelletier and Caventou, equal to 0,609 grain French: this was taken at night, on going to bed, in pill, but no sleep was produced; but there was great restlessness, a desire to rise, or, as he expressed it, an inability to keep himself down, giddiness, partial delirium—in fact all the symptoms of intoxication from opium were produced: the next day, headache, heat of the palms of the hands, lassitude, and some febrile symptoms were the consequences. Had the medicine not been entirely free from narcotine? A few days before, I had given a 1-4 of a grain to a child four years old, with dysentery, which produced sleep without convulsive motions, and calmed the symptoms. At any rate, more information is still wanted on this medicine. *A. T.*]

EMETINE.

In a memoir presented to the Academy of Sciences, in 1817, we established (M. Pelletier and myself) by a series of physiological and chemical experiments, that the different species of ipecacuanha owe their emetic power to an immediate particular principle, which M. Pelletier has named emetine:* and, as this substance is much more active than ipecacuanha itself, as it has not its disagreeable taste nor nauseous smell, we thought we might substitute it on all occasions for ipecacuanha with advantage. That nauseous odor of the ipecacuanha resides in a greasy odoriferous matter, altogether independent of its emetic property, for M. Caventou took as much as 6 grains with impunity.

M. Boulay has just found emetine in the violet, (viola odorata:) he has given it the name of violine or indigenous emetine.

Preparation of colored emetine. The ipecacuanha should be reduced to powder; treated with ether at 60° to dissolve the scented fatty matter; when the pulverized substance yields no more to the ether, it should be strained with alcohol, the alcoholic tinctures placed in a water bath, and the matter dissolved in cold water. It then leaves the wax and the little fatty matter which it retained: nothing more remains but to put it in maceration with the carbonate of magnesia, where it loses its gallic acid, to redissolve it by alcohol, and to evaporate to dryness.

[* Since other vegetables possess the emetic property, and may derive it from other alkaline or chemical substance, the name of emetine applied to this principle of ipecacuanha is not altogether appropriate; it is too general, unless it should be discovered that this same substance exists in all vegetables possessing the emetic property. *A. T.*]

Thus prepared, emetine is not yet entirely pure, as we at first thought, but it may serve with advantage as a medicine, (see next article.) It presents in the form of transparent scales, of a reddish brown color; its odor is almost nothing; its taste bitter, but not nauseous. This substance can support a heat equal to that of boiling water, without alteration; it is very deliquescent, soluble in water, and uncrystallizable.

Physiological properties of emetine. On dogs and cats, emetine, in the dose of 1-2 a grain to 2 or 3 grains, produces vomiting, followed sometimes by quite a long sleep. In a stronger dose, 10 grains for instance, the emetine produces on dogs a repeated vomiting, after which the animal is sleepy. But, instead of returning to health, as in the case where emetine is given in a small dose, the animal dies, generally in twenty-four hours. On opening the body, it is found that death is produced by a violent inflammation of the tissue of the lungs and of the mucous membrane of the alimentary canal, extending from the cardiac orifice to the anus. These phenomena bear great analogy to those produced by tartar emetic, and which I have described in a special memoir (On the Influence of Emetics on Man and other Animals, Paris, 1813.)

The results are the same, if the emetine be injected into the jugular vein, or merely absorbed from any point of the body. [Does Mr. Majendie mean to say, that the intestines are inflamed when it is introduced into the circulation? *A. T.*]

Action of emetine on man in health. 2 grains, swallowed fasting, give rise to prolonged vomiting, followed by an evident disposition to sleep. Sometimes a 1-4 of a grain suffices to produce nausea and vomiting.

Action of emetine upon the diseased man. This action is altogether analogous to that which takes place in persons in health. As with them, the emetine produces vomiting and stools; but, moreover, we may easily be convinced that it has a happy influence on catarrhal affections, particularly those

which are in a chronic state. (See Chemical and Phisiological Researches on Ipecacuanha, by Messrs. Majendie and Pelletier, Paris, 1817.)

Cases in which emetine should be employed are the same as those in which ipecacuanha is made use of.

Employment of emetine. To procure vomiting with emetine, 4 grains of it should be dissolved in some vehicle, and the solution given in divided doses.

If a medicine so soluble is administered at once, the first vomiting brought on will expel the whole from the stomach, without any other effect. The following mixture may be used:

Emetic mixture.

℞ Emetine, 4 grains,
Light infusion of orange leaves, 2 ounces,
Syrup of orange flowers, 1-2 ounce.

Give two tea spoonfulls every half hour.

In chronic pulmonary catarrhs, whooping cough, chronic diarrhœa, the following lozenges may be employed, which replace advantageously the ordinary ipecacuanha lozenges:

Pectoral emetine lozenges.

℞ Sugar, 4 ounces,
Colored emetine, 32 grains.

Form into lozenges of 9 grains each.

It is usual, in pharmacy, to color these lozenges of a rose color, to distinguish them from lozenges of ipecacuanha. A little carmine lake is used for this purpose.

Give one of these lozenges every hour. If given oftener they will excite nausea.

Emetic lozenges of emetine.

℞ Sugar, 2 ounces,
Emetine, 32 grains.

Form into lozenges of 18 grains each.

One of these lozenges, taken fasting, is sufficient ordinarily to produce vomiting in children. Three or four excite it quickly in adults.

The syrup of ipecacuanha of the shops may be supplied by the following syrup:

Syrup of emetine. ℞ Simple syrup, 1 pound,
Colored emetine, 16 grains.

This syrup is used under the same circumstances and in the same manner as the syrup of ipecacuanha.

[In my first exhibitions of this medicine in practice, I was somewhat disappointed; I gave it in doses of 4 to 6 grains, without any or with but trifling effect; I took myself 6 grains of it without producing any effect for two hours. Supposing the solvent might make a difference, as I had given it in pump water, I altered my prescriptions and ordered rain water, and have since found that 3 grains were sufficient to produce full vomiting.

From the peculiar effects of this medicine on the tissue of the lungs, it will probably be found better calculated for the catarrhal diseases of winter than the bilious diseases of summer. *A. T.*]

PURE EMETINE.

The emetine of the preceding article is not in a state of purity; it is to pure emetine what brown sugar is to the white and crystallized. M. Pelletier, in a work, the chemical part of which is not yet finished, shows how to separate entirely the active matter of the ipecacuanhas. It is a new vegetable alkali, the principal characters of which are as follows:

Preparation of pure emetine. To obtain emetine pure, it is necessary to substitute, for the carbonate of magnesia, the calcined magnesia; adding enough of this base to take up the free acid which exists in the liquor, and also that which is combined with the emetine.

The emetine, set free and rendered less soluble, is precipitated and mixed with the excess of magnesia. The magnesian precipitate, washed with a little very cold water, which takes away the coloring matter not combined with the magnesia, should be dried with care, and treated with alcohol, which dissolves the emetine. This, obtained by evaporation of the alcohol, should be redissolved in a diluted acid, and treated by purified animal carbon. After this operation, intended to bleach it, it is precipitated by a salifiable base.

The wash water of the magnesian precipitate still retains some emetine, which may be obtained by another series of operations.

The pure emetine is white, pulvurulent, unalterable in the air, while colored emetine is deliquescent. This substance is little soluble in cold water; it is more so in warm; but it dissolves very well in ether and alcohol. Its taste is slightly bitter. The emetine is very fusible: at 50° centigrade (122 Fah.) it liquifies. It restores to blue the turnsol reddened by an acid. It is dissolved by all the acids, diminishing their acidity without destroying it entirely. It forms, with acids, acid combinations evidently crystallizable: it approaches to

veratrine in that respect. It is precipitated from its combinations by the gall nut, in the same manner as the cinchona. Also, the gall nut will be, in the case of poisoning with it, the only convenient antidote. M. Caventou swallowed a dose of emetine more than sufficient to produce violent vomiting, and neutralized the action by means of a decoction of gall nuts.

Messrs. Dumas and Pelletier give, for the composition of pure emetine taken from the cœphalis emetica, (see their memoir,) as follows: carbon, 64,57; azote, 4; hydrogen, 7,77; oxygen, 22,95—total, 99,29.

Action of pure emetine on man and other animals. This action is the same as that of colored emetine, but it is much more energetic. 2 grains are sufficient to kill a moderate sized dog. I have seen vomiting produced by a 16th of a grain, in a man 85 years old, who vomits, it is true, with extreme facility.

Employment of pure emetine. I have used, for some time, lozenges composed as follows:

Pure emetine lozenges. ℞ Sugar, 4 ounces,
Pure emetine, 8 grains.
Form lozenges of 9 grains each.

To produce vomiting, 1 grain of emetine may be put into a potion; and, as this substance is not very soluble, it may be first dissolved in acetic or sulphuric acid. The following formula may be used;

Emetic draught.

℞ Infusion of flowers of linden, 3 ounces,
Pure emetine, dissolved in q. s. of nitric acid, 1 grain,
Syrup of marshmallows, 1 ounce.

The dose is a table spoonfull every quarter of an hour until vomiting.

A syrup may be formed according to the following process:

℞ Syrup of pure emetine, 1 pound,
Pure emetine, 4 grains.

Two tea spoonfulls are used of this syrup.

[The entire separation of the nauseous taste of the ipecacuanha from this medicine, and which is one of the great advantages it possesses, would seem to render these various preparations of syrup, lozenges, mixtures, &c. entirely unnecessary. The little solubility of the pure emetine may require some syrup or the acetic acid to exhibit it in, but the slightly bitter taste of either the pure or the colored is no objection to it; all that is required for the latter is, to dissolve the number of grains required, 3 to 6 for an adult, in a certain number of spoonfulls of pure water; it should be rain or distilled, and exhibited by spoonfulls at a time. *A. T.*]

ALKALIS,

EXTRACTED

FROM THE CINCHONA BARKS.

Messrs. Laubert, Rheuss of Moscow, and Gomez of Lisbon, published, some years since, and almost at the same time, very interesting works on the cinchonas, but they were not agreed upon the substance to which they should attribute the febrifuge property. Messrs. Pelletier and Caventou, induced by their preceding researches to believe that there existed in fact a substance endowed with this property, occupied themselves in searching for it; and, following the same principles which had so happily guided them in the discovery of strychnine, emetine, &c., they obtained a substance which they recognized as that which M. Gomez had described under the head of cinchonine, but in which they discovered its alkaline power, a property very important, and which had escaped the Lisbon chemist.

It was in laboring on the grey bark (cinchona condaminea) that they obtained the cinchonine. It was judged most convenient so to change the termination, to make this name harmonize with the other vegetable alkalis. The yellow bark (cinchona cordifolia) furnished them an alkali which, although similar to the first in many points, differed from it by properties too remarkable for them to be confounded together: they designated it by the name of quinine.

The analysis of the red bark (cinchona oblongifolia) followed that of the yellow. It was a matter of curiosity to ascertain if this species, considered by a great many physicians as eminently febrifuge, contained cinchonine, quinine, or if a third variety could be found. Another circumstance on which they had not thought offered: they obtained cinchonine resembling in every respect that from the grey bark, but in three times as large a quantity, and of quinine almost

double what was obtained from an equal quantity of the yellow. This quinine, besides, except some light shades of difference, (its greater fusibility and the look of its sulphate,) offered all the characters of the other. The ulterior researches, made upon large masses, have shown that the quinine and cinchonine exist simultaneously in the three kinds of bark; but in the grey the cinchonine is, in relation to the quinine, in much larger quantity. The contrary is the case in the yellow, and the quinine is there so predominant that it is not surprising that the other escapes when small portions are operated on. Dr. Michaelis, physician at Madgeburgh, has analyzed the different species, and has determined as follows the different proportions of cinchonine and quinine which are contained in them:

	Cinchonine.	*Quinine.*	*Total.*
China rubra,	32 grs.	64	96
China loxa,	18	8	26
China fusca,	0	75	75
China fusca Huanuco,	50	32	82
China fusca superf. Huanuco,	74	28	102
China fusca superf. Huamalies,	0	12	12
China fusca Huamalies,	48	28	76
China fusca Huamalies infer.	60	34	94
China fusca Tenn superf.	12	44	56
China fusca Tenn medioere,	12	80	92
China flava Carthagena,	28	48	76
China regia in rolls,	0	154	154
China regia in joined pieces,	0	286	286

Preparation of the cinchonine and of the quinine. The bark is exhausted by alcohol of all bitterness; distilled to dryness by the water bath; the alcoholic extract dissolved entirely in boiling water strongly sharpened with hydrochloric acid. A large portion of calcined magnesia is added, to fix all the red coloring matter and render the liquor clear, which happens after boiling several minutes. It is left to cool, thrown on a filter, and the magnesian precipitate washed

with cold water; it is dried by a stove, then treated several times with boiling alcohol, in order to take away all bitterness; the alcoholic liquors are mixed, and the cinchonine crystallizes by cooling. The cinchonine thus obtained is still altered by a green fatty matter, which it abandons if it be dissolved by a highly diluted acid: if the acid has been too concentrated, it will dissolve a part of the fatty matter, and the object will not be obtained.

The quinine is obtained from the yellow bark in the same way as the cinchonine from the grey.

The cinchonine and the quinine, we have said, are found in the three species of the bark. The following is the way they are procured in the same operation:

After having directly obtained the sulphate of quinine by the process just described, the mother waters and the wash waters obtained from the process are mixed: these retain the sulphate of cinchonine. Until lately it was taken for sulphate of quinine, rendered uncrystallizable by the yellow matter, and a little of the fatty matter, which, it is true, are met with in these liquors. These waters are taken and decomposed by magnesia: lime may be equally well used. The magnesian precipitate, washed and dried well, is treated with boiling alcohol, which dissolves the quinine and cinchonine. But here the cinchonine, being predominant, crystallizes at least if the liquor be well charged: if the contrary, it should be concentrated some. The cinchonine thus obtained must be purified by crystallization. For this purpose it is dissolved in a sufficient quantity of boiling alcohol, by which means it is obtained quite pure. The alcoholic mother waters retain quinine, which is obtained by evaporation.

Chemical properties of the cinchonine. The cinchonine is white, translucent, liable to crystallize in needles, only soluble in 700 parts of cold water, from whence arises its little taste. Dissolved in alcohol, or rather in an acid, it gives a strong bitter taste, which resembles entirely the grey bark. The cinchonine does not dissolve but in small quantities in fixed

oils, in volatile oils, or sulphuric ether; it unites with the acids and forms salts more or less soluble. The cinchonine has the property of being volatilized at a certain temperature: the greatest part of the substance, it is true, is destroyed in in the operation; but a sensible part of the matter escapes the action of calorific decomposition.

The sulphate and acetate of cinchonine is used in medicine; the first of these salts is very soluble in water, the second much less so, but an excess of acid dissolves it easily.

Chemical properties of quinine. The quinine is white: it never has appeared susceptible of crystallization by solution; however, Messrs. Dumas and Pelletier have made out to give to quinine a crystalline texture by submitting it to igneous fusion in a vacuum, and letting it cool slowly. In this case, instead of preserving its resinous appearance and its transparency, it contracts, becomes opaque, and forms on its surface centres of crystallizations, which radiate on all sides, and thus produce a watered appearance: the fracture of the mass is crystalline. Since these observations, M. Pelletier has attained to crystallize quinine in fine silken bunches, by leaving to itself a very pure alcoholic solution of quinine. (Journal of Pharmacy, June, 1825.) It is also less soluble in water than the cinchonine; however, its taste is much more bitter. Its salts are also in general more bitter; they have a pearled appearance, which distinguishes them. Quinine is very soluble in ether, while the cinchonine is very little so, which affords a mean not only of distinguishing their bases, but also to separate them when they are found united. Melted quinine becomes idioelectrique, and takes on resinous electricity with great intensity, when it is rubbed with a piece of cloth.

Messrs. Dumas and Pelletier obtained, for the mean composition of quinine, as follows: carbon, 75,38; azote, 8,72; hydrogen, 6,15; oxygen, 9,85—total, 100.

Mr. Brande found that quinine was composed as follows: carbon, 73,80; azote, 13; hydrogen, 7,65; oxygen, 5,35—total, 100.

The same chemists have found that the cinchonine is composed as follows: carbon, 76,97; azote, 9,02; hydrogen, 6,22; oxygen, 7,97—total, 100,19.

Mr. Brande (Annals of Philosophy, April, 1824,) has obtained, in the analysis of cinchonine, a result very different from that of Messrs. Dumas and Pelletier. According to this chemist, the mean composition of cinchonine will be, carbon, 79,30; azote, 13,72; hydrogen, 7,17—total, 100,19.

Preparation of the sulphate of quinine. M. Henry (the son) has just made known a cheap and expeditious process for obtaining directly the sulphate of quinine. He treats it several times with warm water, sharpened with sulphuric acid, (6 or 8 grammes to a kilogramme of distilled water;) he filters through thick linen, bleaches the liquors with quick lime, and washes the precipitate formed to separate the excess of lime. This deposit, well drained, is digested, at several times, in alcohol at 36°. The alcoholic tinctures are put together in the water bath of an alembic; distilled to collect the spirit of wine, which is united in the new operations; and there remains, for a residue, a brown, viscous, bitter matter, which is in a great measure formed of impure quinine. This mass, while warm, is treated with water sharpened by sulphuric acid; filtered through paper, and the liquor, on cooling, gives crystals formed of sulphate of quinine, which a second solution and crystallization give perfectly pure.

The same mode of preparation has been tried to extract the sulphate of cinchonine from the grey bark. It did not succeed so well.

The sulphate of quinine, obtained by this mode, is presented in the form of white crystals, entirely soluble in water; little soluble in cold, but more so in boiling water, especially if slightly acidulated.

The sulphate of quinine possesses a very remarkable quality, observed for the first time by M. Callaud d'Annecy.

This salt, exposed to a temperature of a hundred degrees, (212°,) becomes luminous, especially when submitted to light

rubbing. Messrs. Dumas and Pelletier have submitted about two or three ounces of sulphate of quinine, shut up in a glass bottle which they kept in a water bath, for half an hour, at the temperature of boiling water; it then threw out, by friction, a white light quite intense. In passing through the cork of the bottle a metallic wire, terminating in a point at the inner extremity and by a ball at the outer, these gentlemen, on approaching the ball to the knob of an electroscope of Volta, and, after having shook the bottle before each contact, obtained all the separation of which the bases of the electroscope are susceptible: the electricity is constantly vitrious. The sulphate of cinchonine enjoys the same phosphorescent property, but in a less degree, and possesses the electric power to the same extent.

After the principle established by the experiments of Messrs. Pelletier and Caventou, that pure water is incapable of exhausting the barks of their quinine and cinchonine, M. Guerette, chief apothecary of the hospital of Toulouse, undertook some new experiments on this subject, and he has found that the barks drained by aqueous decoctions, and which were rejected in hospitals as useless, were still capable of furnishing nearly two thirds of the quinine and cinchonine which they contained in their natural state. This observation proves, then, that it is essential to preserve the remains of the barks treated by water, to provide at need for the preparation of the febrifuge salts.

Prepartion of the acid sulphate of quinine. M. Robiquet, using a process little different, has obtained a sulphate the characters of which are not the same as those which we have just mentioned; it is in solid prisms, transparent, of flat quadrangular form, handsomely terminated, and soluble if cold. Desiring to know whence arose this difference, M. Robiquet has submitted the two sulphates to a comparative examination, and he ascertained that the solution of the prismatic sulphate was acid, while the other was alkaline. He has tested the stability of these characters, and, after several

crystallizations, the salts preserved them unaltered; however, the subsulphate lost each time a portion of its acid. M. Robiquet found, besides, that if he obtained constantly the acid sulphate, it was owing to this, that, in treating the quinine with water, he could not dissolve it, but by means of a light excess of acid, while, if he made use of alcohol, as the quinine is easily dissolved in this, there is no need of adding a greater portion of acid than is necessary for saturation.

Comparative analysis of the two sulphates of quinine. M. Robiquet, in the work which has been mentioned, has given an analysis of these two sulphates; but, as he has remarked that at each crystallization the subsulphate lost a portion of its acid, he thought it proper to make known the composition of this salt after the first and after the third crystallization: 100 parts acid sulphate of quinine gave, acid, 19,1; quinine, 63,5—total, 82,6. 100 parts subsulphate, first crystallization, gave, acid, 11,3; quinine, 79,0—total, 90,3. 100 parts subsulphate, second crystallization, gave, acid, 10,0; quinine, 80,9—total, 90,9.

However, it is probable that M. Robiquet did not procure the subsulphate very pure, for we know, from the experiments of Messrs. Pelletier and Caventou, and those recently made by M. Baup (Annal. de Phys. et de Chim., vol. 27, Nov. 1824,) that that which is called subsulphate of quinine always presents constant proportions as regards the state of a hydrate.

M. Baup regards the common sulphate of quinine as a neutral salt. He thinks, with reason, that it is better to employ in theraputics the efflorescent sulphate, the composition of which is invariable. In fact, if the neutral sulphate is preserved in a moist place, it will only contain 76 of quinine in the 100; if, on the contrary, it be kept in a dry place, and in a vial loosely stopped, it will contain as much as 86.

According to M. Baup, the dry acid sulphate of quinine contains, acid sulphate—acid 18,181, base 81,819—total 100; neutral sulphate—acid 10, base 90—total 100;

neutral sulphate invariably efflorescent—acid 9,57, base 86,-12, water 4,31—total 100.

To obtain this efflorescent sulphate of quinine, it is necessary, according to M. Baup, to expose the common sulphate to the open air, at a temperature of 29°, (68°.) Twenty-four hours is sufficient for the salt to become completely efflorescent, and it loses no more by a longer exposure.

Acetate of quinine. This is remarkable for its great facility of crystallization. It is but little soluble in cold water, even by adding an excess of acid; it forms a mass by cooling.

Action on animals. The alkalis on which we have been treating were no sooner discovered, than one of the authors of this interesting labor, M. Pelletier, sent me a certain quantity to study its effects on animals. I soon found that these alkalis, as well as the salts just mentioned, were in no ways poisonous, and even that they had no sudden or appreciable action. They could be then, with confidence, tried upon man sick or well.

Action upon man in health and diseased. Numerous observations had induced me to consider these two alkalis as possessing the medical qualities of the barks, and consequently as capable of being substituted for them in all cases. Several physicians, among whom I will mention Messrs. Double, Villerme, and Chomel, occupied themselves on the same subject, and their observations conducted them to the same result as mine.

It may be conceived what advantage must result, in the treatment of diseases, to know precisely the dose of an active substance which is employed, and this advantage is no where better marked than in the case in which we are now engaged, since the quantity of alkalis contained in the barks vary prodigiously, according to the nature and quality of the barks which are employed. We are, besides, often very happy to be able to administer this remedy in so small a volume, and under a form not at all obnoxious. It has been seen, in de-

structive fevers, that patients perish from this alone, not being able to swallow the necessary quantity of barks in powder; others vomit it up after having taken it; some take on excessive purging, so that the powder passes the intestinal canal without producing any effect. In the most favorable cases, it is necessary that the stomach of the patient should analyze chemically, so to say, the bark with which it is filled, and from which it must extract the febrifuge principle; but this labor is always difficult and fatiguing, even to the strongest stomachs: it is, then, a real service which chemistry has rendered to medicine, in having found means to make this separation previously.

M. Caventou has informed us of the effects which he constantly produced by the use of the sulphate of quinine during his labors with M. Pelletier on the barks: he had frequent occasion to taste many liquids containing quinine and cinchonine; he experienced a general excitement, resembling that produced by coffee; the analogy to this action was so striking that he had the idea, as well as M. Pelletier, of analyzing coffee, which several physicians recommended in the treatment of fevers. They did not find either cinchonine or quinine in coffee, but a vegetable base easily crystallizable in long, white, silky filaments, amiantaccous, upon which they did not think proper to pursue their researches, because they learnt that one of their colleagues, M. Robiquet, was occupied on the same object, and had even already his labors advanced upon this base, which has been designated since by the name of cafeine, ang. coffeeine. It is to be regretted that M. Robiquet has not published this result.

The employment of the sulphate of quinine is now generally extended, and its efficacy in fevers of an intermittent type is more and more confirmed. Cases of intermittent fever cured by this mean have been published in all the collections of works of academies and in all journals of medicine. Among the different authors who have written on the subject, and who have spread the use of the febrifuge alkalis, we will

mention Dr. Elliotson, (Trans. Med. Chirur. vol. 12. part 2, 1824,) physician of St. Thomas's Hospital, London, who published a very interesting memoir, on the employment of quinine and its sulphate. The pure quinine has given him the same results as the sulphate in intermittent fevers. He has also given this remedy with advantage in intermittent neuralgias and in typhus. The doses in which this physician administers the quinine and the sulphate are much larger than those in which we give it; he affirms, however, that he has met with constant success. He gave the pure quinine in the dose of 5 grains every six hours: he has even given as high as 10 grains with the same intervals, without any accident.

Dr. Francis Barker,* dean of the physicians of the hospital for the treatment of fevers at Dublin, in the Transactions of the College of Physicians of Ireland, has reported thirty cases of intermittent fever of different types which have been cured by the use of the sulphate of quinine. The dose which he gave was from 1 to 3 grains, rarely 4, four times a day. 6, 8, and 10 grains have often been sufficient to prevent the return of fever. However, in some cases, the quantity of sulphate of quinine taken by patients has been 24 to 30 grains, and even in one case it was carried to 44 grains. In the same collection is found a memoir of Dr. John O'Brien, in which this physician reports six cases of typhus treated with sulphate of quinine: in six individuals treated by this mode, (3 to 4 grains a day were given,) two were cured as promptly as when the sulphate is given in intermittent fevers; in three others the success was less rapid, but as complete; the sixth patient died. We may be astonished, perhaps, to see the sulphate of quinine administered for typhus in England, when the antiphlogistic plan appears so generally adopted in France;

* Transactions of the Association of Fellows and Associates of the King's and Queen's College of Physicians in Ireland, vol. 4, 1824, Dublin.

but we shall cease to be so, when it is known that I have seen, at the hospital of St. Thomas in London, Dr. Elliotson administer the sulphate of quinine in large doses for erysipelas, and without accident.

M. Bally has also treated, at the hospital de la Pitie, a large number of intermittent fevers with the sulphate of quinine, and always with success.

The efficacy of this remedy is not contraindicated in the treatment of putrid fevers. I have reported in my Journal (Jour. de Phys. Exp. July, 1822,) the first examples of putrid fevers so cured by the sulphate of quinine. It was my coadjutor, M. Renauldin, who communicated to me the first fact: I had occasion, a short time after, to give the same remedy with success, (same collection, Oct. 1821) and now there is no longer a doubt of the utility of this alkali, and the precious advantages which induce a preference of the quinine and its salts to all the other preparations of the bark. M. Dupre, (same Journal, April, 1822,) health officer at Cerisiers, Messrs. Ribes (same Jour. Oct. 1822,) and Piedagnel, (same collection, April, 1822,) have published interesting cases of neuralgias cured by sulphate of quinine: and since, the efficacy of this remedy has been still confirmed in a great number of similar cases.

But it is not only in simple and putrid intermittent fevers, and in neuralgias, that the employment of the sulphate of quinine has been advantageous.

Dr. Klokow (Journal der Practishen Heilkunde, June, 1824,) has arrived, by means of the sulphate of quinine, to arrest, in a woman fifty years old, a very considerable hemorroidal discharge, which had endangered the patient's life. He gave 4 grains of the sulphate at a time: after the second dose the discharge was arrested. The mineral acids, ipecacuanha, and opium, had been employed without success.

Dr. Goupil has treated a man twenty-eight years of age, affected with a severe disease of the chest, with hemoptysis of an intermittent type, and cured him by giving him 18 grains

of sulphate of quinine in twenty-four hours, after having applied, two days before hand, 15 leeches to the anus, (Nouv. Bibl. Med., July, 1824.)

We will add still farther, that M. L. Martinet (Revue Medicale, March, 1824) has published a memoir on the use of the sulphate of quinine in large doses, in cases of intermittent fevers observed in Italy. It will follow, according to this physician, from the facts which he reports, that the sulphate of quinine, administered in the dose of 12 to 18 grains, in Italy, in quotidien and quartan fevers, did not suppress the paroxyms; but that, given from 20 to 24 grains, it stopped these same fevers completely; that it did not produce any disadvantageous effect upon the abdominal viscera, and that the patients were cured. M. Chomel has given the sulphate of quinine in dose of 36 grains for a single dose with success. We are going to show here some of the results obtained by Italian physicians.

Prof. Mathœis has treated with the sulphate of quinine thirty-one patients affected with tertian fevers, single or double: he has obtained a cure of them; but he was obliged, he says, to carry the dose from 15 to 35 grains in two or three days. This physician reports, also, two cases of putrid fevers cured, one by the bark, the other by the sulphate of quinine.

M. de Rossi has treated sixty-four persons, affected with intermittent fevers of different kinds, and of various types, by means of sulphate of quinine: 8 tertian fevers, 29 double tertian, 2 quartan fevers, 27 subcontinued, and 8 putrid were cured; 50 patients had no paroxysms after the first dose, 7 had them very light. The quantity of sulphate given varied from 12 to 72 grains; but, in twenty-four cases, 24 grains were not exceeded.

The results obtained by M. Tonelli also deserve to be quoted. He has reported 65 cases of intermittent fevers cured, with the exception of one patient only, to whom the sulphate was administered when he was despaired of. Here is the de-

tail of cases reported: 4 quotidien fevers, 22 tertian, 31 double tertian, 3 quartan, 2 double quartan, 2 subcontinued, 1 putrid intermittent. 42 patients had no paroxysm after the administration of the first dose. The quantity of sulphate given to each person varied from 12 to 18 grains.

Manner of employing the alkalis extracted from the barks. It is perceived that the preparations the most employed hitherto are the sulphates of quinine and cinchonine. From 1 to 10 grains of the first are exhibited in twenty-four hours.

If some physicians have thought proper to go much beyond this dose, in general the success has not answered their expectation. Several patients, indeed, have experienced quite severe symptoms, such as great agitation with very strong cerebral excitement. In any case I have not been obliged to give more than 10 grains in twenty-four hours, and I have never seen this salt fail of its effect.

M. Alphonse Menard, physician at Lunel, who appeared to have had frequent occasions to treat the access of fevers, has published (Revue Medicale, Nov. 1823,) a memoir on the inconveniences of the sulphate of quinine in large doses in the treatment of remittent and intermittent fevers; he asserts that, for the most part, 6 grains were sufficient with him, to stop the progress of the disease in adults; some facts seem even to prove that 2 to 4 grains were enough, and that it was only in putrid fevers that it was requisite to give from 10 to 14 grains. As to the symptoms which he attributes to sulphate of quinine, we see, by the cases which this physician reports, that the proofs are not very conclusive, because a great number of circumstances, either natural or accidental, appear to have influenced the progress of the disease.*

* These observations apply equally to two cases of gastro-intestinal inflammation attributed to the sulphate of quinine, and reported by M. E. Desportes, (Revue Med., Dec. 1823.) The employment of useful remedies, such as the most of those contained in this Formulary, find, in the indifference of a great many physicians, enough obstacles, without frightening them

A very good thesis upon the preparation and employment of the alkalis of the bark, was sustained by Dr. Ernert; it was entitled, De Medicamentis in Fibribus Intermittentibus Cortici Peruviano Substitutis. D. I. M. Auctor Frideric. Adam. Ernert, Saxo-Boruss. Def. d. 30 Novem. 1822, 8mo. p. 27.

M. Pelletier has prepared, according to my formula, a syrup of bark, perfectly colorless and transparent. This syrup contains 2 grains of quinine to the ounce; I obtain from it every day the most satisfactory effects; it appears to me to have a happy effect upon the march of scrofulous affections of children.

Syrup of quinine. ℞ Simple syrup, 2 pounds,
Sulphate of quinine, 64 grains.

Six spoonfulls of this syrup is sufficient, in most cases, to stop the access of fevers. I have even seen a putrid fever cease with that dose of the syrup.

Wine of quinine. ℞ Good Madeira wine, 1 litre,
Sulphate of quinine, 12 grains.

This preparation may be made with Malaga wine, or even with common wine.

Tincture of quinine. ℞ Sulphate of quinine, 6 grains,
Alcohol, at 34°, 1 ounce.

For this tincture the sulphate is preferable to the pure quinine, because the tincture made with the alkali not saturated by an acid will be precipitated by aqueous liquors. The wine of quinine may be extemporaneously prepared with this tincture, by putting 2 ounces of the tincture, prepared as above, to a pint bottle.

Preparations of cinchonine. Cinchonine has been employed, also, as a tonic and febrifuge, particularly by Dr. Chomel: but well as he has recognised these two properties, we must remark, that it possesses them in a less degree than

with examples of symptoms at least doubtful: we should have given them, but it is not necessary to publish any but those which do not admit of a doubt.

the quinine; in certain cases even the febrifuge effect has failed completely. It is desirable, therefore, that physicians would make new observations upon this substance, which is found united with the quinine in almost all the barks, and is found alone in that from Carthagena. It is to favor these researches that I have prepared the following formula:

Syrup of cinchonine.

℞ Simple syrup, 1 pound,
Sulphate of cinchonine, 48 grains.

This may be employed in the same doses and under the same circumstances as the syrup of quinine.

Wine of cinchonine.

℞ Madeira wine, 1 litre,
Sulphate of cinchonine, 18 grains.

Given as the wine of quinine: it may be made with common wine.

Tincture of cinchonine.

℞ Sulphate of cinchonine, 9 grains,
Alcohol, at 34°, 1 ounce.

This tincture will serve to make directly the wine of cinchonine, by adding 2 ounces of the tincture to a pint of Madeira wine.

VERATRINE.

It is still to the labors of Messrs. Pelletier and Caventou that we owe the new alkali of which we are going to treat.* These two indefatigable chemists having remarked, that in the family of veratrum almost all the individuals, besides the common characters recognised by all botanists, offered that of possessing a very pungent taste, and of exercising upon animals a similar action, thought that it would be interesting to examine if these properties did not belong to a particular substance common to all these plants. The analysis which they made of the seed of the veratrum sabadilla (the cevadilla) served to confirm their conjectures. They separated the acrid principle, in which they recognised all the alkaline characters; they found it afterwards in the root of the common colchicum, colchicum autumnale, and in that of the white hellabore, veratrum commune, and called it veratrine, from the name of the family to which these vegetables belong.

Preparation of the veratrine. The seed of the cevadilla is treated several times with boiling alcohol. These tinctures, filtered while almost boiling, let fall, by cooling, whitish flakes of wax; the matter dissolved, brought to the consistence of an extract, is taken up by cold water. There then remains on the filter a small quantity of fatty substance; the solution is evaporated slowly; an orange yellow precipitate is then formed, which presents the characters of the co-

* In the 58th page of the German translation of our Formulary, M. G. Kunze observes, that M. Meissner also discovered the veratrine, in 1819, at the same time as Messrs. Pelletier and Caventou, and that he made use of a different process for the extraction of this alkali. He made infusions of the seed of the cevadilla in alcohol middling strong, evaporated and precipitated the alkali with carbonate of potash, and then washed the product with distilled water.

loring matter which is found in almost all ligneous vegetables. A solution of the acetate of lead is then poured into the yet colored liquor; there is immediately formed a new yellow precipitate, very abundant, and which is separated by a filter. The liquor, become almost colorless, contains yet, among other substances, the acetate of lead which has been added in excess. The lead is then separated by means of a stream of sulphuretted hydrogen; the liquor is then filtered and concentrated by evaporation; then treated by magnesia, and filtered anew. The magnesian precipitate is treated with boiling alcohol. The alcholic liquors give, by evaporation, a pulvurulent substance, excessively acrid, presenting all the alkaline characters. This substance is at first yellow: by solutions in alcohol, and precipitations produced by pouring water into the alcoholic solutions, it is obtained in the form of a very white powder, perfectly inodorous.

Chemical properties of veratrine. Veratrine is very little soluble in cold water. Boiling water dissolves a thousandth of its weight, and acquires a sensible acridity.

It is very soluble in ether, and more yet in alcohol. It is insoluble in alkalis, and soluble in all the vegetable acids. It saturates all the acids, and forms with them uncrystallizable salts, which, by evaporation, take on the appearance of gum. The sulphate only presents rudiments of crystals when it is with excess of acid.

The nitric acid combines with veratrine; but if it is put in excess, especially when it is concentrated, it does not produce a red color, as takes place with morphine, brucine, and impure strychnine, but alters very quickly the vegetable substance in its elements, and gives rise to the formation of a yellow, detonating matter, analogous to Welther's bitter.

Veratrine restores to blue the paper of turnsol reddened by acids. Exposed to the action of heat, it is liquified at a temperature of 50°, (122°:) in this state, it has the appearance of wax; by cooling, it is united in an amber colored mass, and the color translucent. Distilled at an open fire, it swells,

is decomposed, and produces water, much oil, &c. It leaves a volume of carbon, which, burnt, leaves a very small residuum slightly alkaline.

Messrs. Dumas and Pelletier have made three analyses of veratrine extracted from the cevadilla. The results of these analyses differ but little from one another, (see their memoir:) carbon, 66,75; azote, 5,04; hydrogen, 8,54; oxygen, 19,60 —total, 99,93.

Action of veratrine upon animals. A very small quantity of acetate of veratrine,* injected into the nostrils of a dog, provokes immediately a violent sneezing, which lasts sometimes near a half an hour.

One or two grains thrown into the throat determine immediately a very abundant salivation, which lasts some time.

If the same quantity of this substance be injected into any point of the intestinal canal, and the abdomen opened to observe its effects, the intestine will be seen to be much hardened, then to relax, then to contract again, and thus to continue for a certain time. The part of the mucous membrane which is found in contact with the veratrine is inflamed; the irritation spreads and determines vomitings and alvine evacuations. Given in a larger dose, it produces a great acceleration of the circulation and of respiration, soon followed by tetanus and death.

The effects are still more rapid, if we inject under the pleura or into the tunica vaginalis one or two grains of this substance: in less than ten minutes we see death take place after the tetanic phenomena.

The same quantity injected into the jugular vein produces, also, but in a few seconds, tetanus and death. Autopsy of the body shows that, even in this case, the veratrine has ex-

* Of all the preparations of veratrine, the acetate only, as being one of the most active, has been used in the experiments which had for their object to ascertain the action of this substance upon animals.

erted an action upon the intestinal canal, the mucous membrane of which is found highly injected. The lungs, also, show signs of inflammation and engorgement. After what has been given above, we see, that this substance, thrown in small quantities into the intestinal canal, produces only local effects, or at least effects confined to the intestinal canal, and that it is necessary that it should be administered in a large dose, or thrown upon parts where absorption is very active, such as the pleura and tunica vaginalis, to produce general effects, which we have just shown are so terrible. M. Andral (son) has published a note on the action of veratrine, in the first number of my Journal de Physiologie.

Action of veratrine on the well and on the sick. The effects of veratrine in large doses have not been observed upon man: without doubt they would be the same as those observed upon animals.

The taste of veratrine is very acrid, but without any mixture of bitterness; it excites, however small the quantity may be that is taken into the mouth, a very abundant salivation.

Although the veratrine is absolutely inodorous, there is an inconvenience, when it is in a pulvulurent state, from smelling it too near. The small quantity carried into the nostrils by the air is sufficient often to promote violent sneezing, which may become dangerous.

Thrown in the dose of a quarter of a grain into the intestinal canal, it determines promptly very abundant alvine evacuations: in a little larger dose, it provokes vomitings more or less violent.

I have given it lately in the dose of 2 grains in twenty-four hours, without obtaining too abundant evacuations. The patient was an old man who had been taken with apoplexy some time before. It is a new proof that the state of the nervous system influences medicines very much in the manner of acting.

After having tasted with care the potion which contained these two grains of veratrine, I experienced for several hours

an insupportable acridness in the mouth and pharynx. The impression had not entirely gone the next day. The patient experienced nothing of the kind.

Cases in which the veratrine may be employed. This substance, producing the same effects as the plants from which it is drawn, may be substituted for them, and with much advantage, since we know in this case what we are ignorant of in the other, the quantity of active substance which we make use of.

The veratrine answers, moreover, to excite promptly, in cases where it is necessary, full alvine evacuations: given with this intention, it has succeeded very well in certain old men, in whom there existed an enormous accumulation of fœcal matter in the large intestine. In the pharmaceutic preparations of which the colchicum and the hellebore form the base, the veratrine may replace those substances; they will become then therapeutic agents more powerful, more convenient, and more sure. The pills of Bacher, l'eau medicinale d' Husson, the simple tincture of colchicum, will cease to be remedies unbelieved in and too often complained of by practitioners.

The following are some formulas which we have written out, to replace those of which we have just spoken:

Pills of veratrine. ℞ Veratine, 1-2 grain,
Gum arabic and syrup of gum, a sufficient quantity to make 6 pills of 1 grain each. One of these pills may first be given, and if purgative effects are not obtained, 3 may be given in a day; they will replace with advantage the pills of Bacher.

Tincture of veratrine. ℞ Veratrine, 4 grains,
Alcohol, 1 ounce.
This tincture is administered in the dose of 10, 15, 20, and 25 drops in a cup of drink. It may be given internally with advantage, instead of the tincture of colchicum, in dropsy, in leucophlegmasia and anasarca; and, to the exterior, by friction, in those same diseases and in gout.

Solution of veratrine. ℞ Sulphate of veratrine, 1 grain,
Distilled water, 1 ounce.

This solution may replace the l'eau medicinale d' Husson.

Ointment of veratrine. ℞ Veratrine, 4 grains,
Axunge, 1 ounce.

This ointment may be employed externally in cases of chronic rheumatism, anasarca, and in gout.

HYDROCYANIC
OR
PRUSSIC ACID.

In a memoir presented to the Academy of Sciences, in the month of November, 1817, I have made known the happy effects which followed the employment of the prussic acid in the treatment of diseases of the chest. Since that time, this remedy has been employed by a great number of physicians, not only in Europe, but also in several cities of the United States of America. Every where the success has been the same; and this substance, so dreadful in itself, ought now to be regarded as one of the most interesting which the art of healing possesses.

The prussic acid was discovered in 1780, by Scheele; but this chemist could only obtain it mixed with a quantity of water, the proportion of which was never constant. It is to M. Gay Lussac that we owe a knowledge of it in a state of purity. (See Annales de Chimie, tom. 67, p. 128, and tom. 95, p. 136.)

Physical properties. At the ordinary temperature, this acid is liquid, transparent, and without color; its taste, at first cool, becomes soon sharp and irritating; it lightly reddens the tincture of litmus. Its odor is very strong, and, perhaps, very injurious; it only becomes supportable when mixed with a large quantity of air; then it is the same as that of bitter almonds.

Chemical properties. The prussic acid is very volatile. In fact, it boils at 26°, 5′, (80°,)* under a pressure of 0′, 76″, and at 10° (50°) it sustains a column of mercury of 0′, 38″: however, its congelation is easy to effect; it takes place at 15° (5°)* cold: also, when a few drops of this acid are

[* Dr. Ure says 81 1-2°—and 3° of Fah. *A. T.*]

poured on paper, the portion which evaporates almost instantly produces cold enough to crystallize the other. It is the only liquid which possesses this property.

The prussic acid is but little soluble in water; this is the reason that when it is agitated with ten or twelve times its volume of this liquid, it collects on top in the same manner as oils and ethers. Alcohol dissolves it easily.

Left to itself in close vessels, it decomposes sometimes in less than an hour; it is rarely kept over fifteen days.

Preparation of the prussic acid. The hydrocyanic acid is obtained by treating deutocyanide (prusside) of mercury crystallized, but reduced to powder, with two thirds of its weight of fuming hydrochloric acid.

The apparatus which should be made use of, consists of a small tubulated matrass, to which is adapted a tube sufficiently long, bent to a right angle at one of its extremities, which is plunged into a straight bottle, or, what is better, into a proof glass surrounded by ice and salt. The horizontal part of the tube, that which is adapted to the matrass, ought to contain fragments of carbonate of lime, followed by other fragments of chlorure of calcium. The apparatus thus set up, and the matrass placed upon a small furnace, we introduce into this, through the tubular opening, the deutocyanide of mercury and the hydrochloric acid. Heat lightly; the decomposition of the deutocyanide of mercury is effected; the hydrocyanic acid, which results from the action of the hydrochloric acid upon the deutocyanure of mercury, passes through the tube and is condensed in the proof glass surrounded by ice and salt, after being deprived, by its contact with the carbonate of lime and the chloride of calcium, of all the water and all the hydrochloric acid which, by means of the heat, will be volatilized with it.

M. Vanquelin has proposed, to obtain the hydrocyanic acid, to decompose the cyanide of mercury with sulphuretted hydrogen. The apparatus is little different: to the matrass is substituted a balloon, containing a mixture of sulphuret of

iron and of sulphuric acid, diluted with water; the cyanide of mercury is placed in the horizontal tube already described, and near the extremity fitted to the balloon. After the deutocyanure, are placed fragments of carbonate of lead and chlorure of calcium, the former to absorb the little sulphuretted hydrogen which may not be decomposed by the cyanide of mercury, the latter to absorb the water which the hydrocyanic acid may carry with it.

Action upon animals. One drop of the pure prussic acid, thrown into the gullet of the most vigorous dog, makes him fall stiff and dead, after two or three large, hasty inspirations.

A few atoms of the acid applied upon the eye produce effects almost as sudden, and, besides, very similar.

A drop of acid, diluted with a few drops of alcohol, injected into the jugular vein, kills the animal upon the instant, even as though he had been struck with lightning.

In animals thus poisoned by prussic acid, traces of irritability of the muscles can hardly be found a few instants after death.

There may be found, in the Acts of the Society of Medicine of Copenhagen, a memoir of Dr. Viborg, in which this learned man asserts that he has given the pure acid in very large doses without causing the death of the animals. The acid which he used was evidently prepared by the process of Scheele, or some one else, by which means an acid was obtained very impure. It is necessary, then, in order to obtain constant and comparable results, to adhere to the same process: we advise, then, always to employ that of M. Gay Lussac, or that of M. Vanquelin, which we have just pointed out.

Action upon man in health and in a state of disease. The prussic acid, pure, produces upon man the same effects as upon animals. Its vapor, even, ought to be carefully avoided; if it be respired, it gives rise to very severe pains of the chest, and to a feeling of oppression which does not often cease for some hours. Suitably weakened, its effect upon man in a

state of disease is, to calm a too vivid irritability developed in certain organs.

Given in a suitable dose, but at too short intervals, we see it produce headache and a sort of dizziness, which is dissipated in a few minutes.

Cases in which it should be employed. The prussic acid, weakened, as we are going to show, is employed with success in all cases where the irritability of the pulmonary organs is morbidly increased; thus it is used advantagcously in the treatment of nervous and chronic coughs, in asthma, whooping cough, in the palliative treatment of phthisis. A great number of observations now induce the belief that it can procure a complete cure when the disease is yet in its first degree. In England, it is employed with success against the hectic cough, sympathetic of the affections of another organ, and against dyspepsia. Mr. Elliotson, at the hospital of St. Thomas, in London, and in his particular practice, has employed the medicinal prussic acid; it was prepared according to the process of M. Vanquelin, which we have given above;* he has reported more than forty cases of dyspepsia, with or without vomitings, and accompanied with sharp pains in the epigastric region, and of pyrosis, which were cured by the use of the medicinal prussic acid. This same physician cites a case of painters colic, in which Dr. Prout gave the prussic acid and procured instantaneous relief. Mr. Elliotson has also administered the hydrocyanic acid in a great number of affections of the chest; he has almost constantly obtained a cessation of the cough which fatigued the patient. Externally, the medicinal prussic acid, employed in lotions for different diseases of the skin, has not produced in the hands of Mr. Elliotson very marked effects; however, Dr. Thomson† as-

* We mention here the mode of preparation employed, because in England the process of Scheele is almost exclusively used.

† London Medical and Physical Journal, Feb., 1822.

sures, that he has used it in lotions, with constant success, to diminish those itchings and burnings so fatiguing in cutaneous diseases, and to have cured several kinds of dartre, especially several persons affected with pimples on the face. (Acne rosacea.) M. Jacob Bouchenel* has published an interesting memoir, on the use of the prussic acid in the treatment of chronic pulmonary catarrh, a memoir in which this physician reports four cases of chronic pulmonary catarrh cured by the hydrocyanic acid. The author closes by saying, that this remedy, employed in small dose, has no more inconvenience than a common draught; that the acute state of catarrh is not proper to use this medicine in, and that the success is more certain when antiphlogistic means are resorted to before employing the hydrocyanic acid. M. Bouchenel has also employed the prussic acid in a case of phthisis; but he attained only to calm momentarily the cough, which leads him to doubt whether the prussic acid has really procured the cure of phthisis. We repeat here, that we have obtained the cure of persons having all the signs of phthisis in the first degree, and even more advanced. It is not a chance assertion on our part.

In Italy, the medicinal hydrocyanic acid is used to calm the too great irratibility of the uterus, even in cases of cancer, and to moderate the activity of the heart in almost all sthenic diseases.

Professor Brera speaks very much of the happy effects of prussic acid in pneumonia;† he advises it also against rheumatism, and as a vermifuge. It is since the professor has employed the hydrocyanic acid in diseases of the heart, that Dr. Maclead administered it in these same diseases; (Bullet. des Sciences Med., Feb., 1824.) He states that he has calmed

* Bulletin de l'Athence de Medecine.—Nouvelle Bibl. Med., Aug., 1824.

† Prospetti de' resultamenti attenuti nella Clinica, Padova, 1816.

by this acid nervous palpitations, those especially which seem to have a derangement of the digestive organs for the cause; he has also used it as a palliative in some cases of aneurism of the heart. He has never carried the dose beyond 28 drops in twenty-four hours, and he has seen in no case serious accidents result from the administration of this remedy.

Dr. Frisch, physician at Nyborg, in Denmark, has calmed intolerable pains, caused by cancer in the breast, and which had resisted all antispasmodics, by washing the surface of the cancerous ulcer with dilute medicinal prussic acid. He has also employed this remedy usefully in several cases of phthisis. He cites a case of cure. Dr. Guerin, of Mamers, has lately employed with success the medicinal prussic acid in two cases of cerebral fever.

Mode of employing it. The prussic acid prepared according to the process of Scheele, has not the medicinal properties sufficiently constant, by reason that the process leaves it quite arbitrary to the preparator. It is best, then, to make use of the prussic acid prepared according to the process of M. Gay Lussac, after diluting it sufficiendy. It is diluted with 6 times its volume of distilled water, or 85 times its weight. It is this mixture that is designated under the name of medicinal prussic acid.

This medicinal acid may also be made by diluting the hydrocyanic acid with 6 times its volume of alcohol; it then preserves better its active properties, and evaporates much less quickly than when it is mixed with water. It has been proposed recently to employ a prussic acid more concentrated: for example, three quarters of water, and one quarter acid; but it seems to me that this method has no advantage over the preceeding process, which is now generally adopted.

The following are the forms under which I give it the oftenest.

Pectoral Mixture. ℞ Med. prussic acid, 1 gros,
Distilled water, 1 pound,
Pure sugar, 1 1-2 ounce.

Make a mixture, of which give a pap spoonful morning and night. The dose of this mixture may be raised to 6 and even 8 spoonfuls in twenty-four hours.

It is necessary to shake the mixture every time it is given, without which the acid accumulates on the surface, which may give rise to serious inconveniences.

Pectoral Draught.

℞ Infusion of ground ivy, 2 ounces,
Medicinal prussic acid, 15 gtts.,
Syrup of marshmallows, 1 ounce.

Make into a draught to be taken by pap spoonfuls every three hours, after having shaken the bottle.

Cyanic syrup.

℞ Syrup of sugar perfectly clarified, 1 pound,
Medicinal prussic acid, 1 gros.

This syrup is used to add to the ordinary pectoral draughts, and to replace the other syrups.

Mixture for lotions.

℞ Medicinal hydrocyanic acid, 2 gros,
Lettuce water, 1 pint.

The dose of the acid may be increased from 2 to 4 gros.

This mixture is used in external applications upon dartres, ulcerated cancers, and for injections in cases of cancer of the uterus.

Remarks on the prussic acid. It is not without motive that we think it a duty to blame the use of prussic acid of Scheele; in fact, this acid is never constant as regards the proportion of the real acid with the water which it contains, if, in making it, the process of Scheele is followed: this arises from the difficulty which exists of always uniting the same circumstances in the same operation. When, to avoid this inconvenience, it is wished to prepare the acid called Scheele's with the pure acid of M. Gay Lussac, by diluting with water this latter acid, what quantity ought we to put to it? M. Robiquet (Journal de Pharmacie, 1818) has proposed to employ two parts of water to one of pure acid. The acid of

Scheele thus prepared is twice as strong as that which we have pointed out, and by that even presents greater inconveniences in its use. These inconveniences are rendered greater by the inexact manner in which the process of M. Robiquet is reported by the Codex of Paris. This formulary prescribes, in citing the memoir of M. Robiquet, to dilute the prussic acid with equal parts of water. After the description of this process, the same formulary gives the receipt of a syrup in which the prussic acid, thus mixed, enters in the proportion of 1 part to 9 of simple syrup. This syrup, thus prepared, cannot be administered but by drops;* if by mishap an ounce were mixed in a draught, a mortal potion would result.

Notwithstanding all that we have said upon the strength of the prussic acid of Scheele, prepared after the Codex and the method of M. Robiquet, most physicians represent it as much more feeble than our medicinal prussic acid, and order it sometimes in the dose of more than one gros in a draught of 4 ounces, to be taken by spoonfuls. The apothecaries of Paris are, for the most part, so habituated to see the prussic acid of Scheele enter in large doses into medicinal prescriptions, that to avoid accidents, they prepare this acid by mixing the prussic acid of Gay Lussac with 40 parts of water. This quantity of water, altogether arbitrary, allows them at least to fulfil without danger the orders they receive, when, by the large dose of the acid, they see that it is not our medicinal acid that the physician has in view in his prescription.

* Several serious accidents have followed the use of this syrup of the new Codex.

SOLUTION
OF
PURE CYANIDE OF POTASSIUM.
As a succedaneum of Prussic Acid.

The difference of the results obtained by physicians who have employed the prussic acid may be attributed to this, that this remedy is not always the same, because of its great volatility, and of the facility with which its elements disunite. We have, at least, pointed out a slight modification in the preparation of the medicinal hydrocyanic acid, which avoids in a great measure this inconvenience. However this may be, Messrs. Robiquet and Villerme have thought that we could substitute with advantage the cyanide of potassium, the effects of which on the animal economy are the same.

Mode of preparation. The process pointed out by M. Robiquet consists in exposing, to a heat a long time kept up, the ferruginous prussiate of potash. Then, the cyanide of iron is completely decomposed, and that of potassium remains untouched. The residue of this strong calcination constitutes a black solid mass, lamellated, which is nothing more than the cyanide of potassium, salted over by the iron and carbon which belongs to the cyanide of iron. This mass is dissolved in water: it deposits the iron and the carbon, while the cyanide of potassium is dissolved, and is transformed into hydrocyanate of potash.

When the operation has been well conducted, the solution is perfectly colorless, and retains no portion of iron. The cyanide of potassium well prepared is very pure, white, and transparent; it can be melted by fire without alteration; it keeps indefinitely, provided it is preserved from humidity.

Action of the cyanide of potassium and of the hydrocyanate of potash upon other animals and upon man. Messrs. Robiquet and Villerme have made experiments upon animals in our presence.

The action of the cyanide of potassium was such that with the tenth of a grain of that salt a linnet perished in one minute; a little less than a grain killed a guinea pig in two or three minutes.

With the hydrocyanate of potash, a small drop not containing more than an hundreth part of a grain of cyanide in solution, made a cock linnet fall dead in about half a minute. A half gros, containing 5 grains of cyanide, killed a large sized dog in 15 minutes. The symptoms of poisoning were similar to those produced by the hydrocyanic acid. There has been no occasion to study on man the symptoms caused by this substance.

Manner of employing it. The cyanide of potassium is dissolved in eight times its weight of distilled water, it is transformed into hydrocyanate of potash. The cyanide mixed with water in this proportion may receive the name of the medicinal hydrocyanate of potash.

We may then, without danger, give this hydrocyanate in the same doses as the medicinal prussic acid, and introduce it into the same preparations as those which are pointed out for prussic acid. We may, besides, render it entirely independent of the action of the small portion of alkali contained in the cyanide, by adding a few drops of some vegetable acid, or by prescribing it with an acid syrup; from this will result the eminent advantage of putting the prussic acid more uncombined.

If the cyanide of potassium be put into a draught instead of the hydrocyanate of potash, we must commence with a quarter of a grain, and increase gradually to a grain, dose which has already been surpassed by some physicians.

Below are some formulas:

Pectoral mixture.

℞ Medicinal hydrocyanate of potash, 1 gros.
Distilled water, 1 pound.
Pure sugar, 1 1-2 ounces.

Give a pap spoonful of this mixture morning and evening,

and the dose may be so divided as to give 6 or 8 in twenty-four hours.

Pectoral draught.

℞ Infusion of ground ivy, 2 ounces,
Med. hydrocyanate of potash, 15 drops,
Syrup of marshmallows, 1 ounce.

Give 2 tea spoonfuls of this draught every three hours.

Another draught with the cyanide of potassium.

℞ Lettuce water, 2 ounces,
Cyanide of potassium, 1-2 grain,
Syrup of marshmallows, 1 ounce.

Give it by pap spoonfuls every two hours.

Syrup of hydrocyanate of potash.

℞ Perfectly clarified sugar syrup, 1 pound,
Med. hodrocyanate of potash, 1 gros.

This syrup is used for common pectoral draughts, and to replace the other syrups.

CYANIDE OF ZINC.

This cyanide has been employed lately in Germany, to replace the hydrocyanic acid. It is added even that this remedy has vermifuge powers sufficiently decided. While waiting for experience to determine, we will point out here the mode of preparation of a compound which, to all appearance, is that which has been used in Germany, in order that some trials may be made.

Mode of preparation. M. Pelletier has made some researches to obtain this combination. The means which has succeeded with him consists in precipitating the sulphate of zinc with the hydrocyanate of potash: a triple hydrocyanate of zinc is formed; this hydrocyanate, well dried and calcined to a dull red, is converted to a cyanide of zinc. It is always mixed with the cyanide of potassium. Is this the preparation extolled by the Germans? It is probable, but there is nothing to prove it directly.

Mode of employment. The cyanide of zinc may be employed in the same doses as the cyanide of potassium. It is necessary to commence with a 1-4 of a grain, (gr. 0,205.) We may advance, but gradually, up to a grain and a half, in a draught, to be taken by spoonfuls. Further, these attempts should be made with a great deal of circumspection.

We read, in the Journal of Practical Medicine of Dr. Hufeland, (1823,) that Dr. Henning derived much advantage from the cyanide of zinc in cases where ordinarily the hydrocyanic acid is given. He obtained, besides, much success in the verminous diseases of infants. He gave, then, a grain of cyanide of zinc mixed with powdered jalap; he also employed it in diseases the consequences of dentition.

Dr. Henning has found this remedy very useful in nervous affections of the stomach, and particularly in cases of cramp

of the stomach. In these diseases, he prescribed the following mixture:

℞ Cyanide of zinc, 1-4 grain,
Calcined magnesia, 4 grains,
Powdered cinnamon, 3 grains.

This dose is given every four hours. Sometimes, also, the cyanide of zinc is mixed with sugar, and the action is favored by giving at the same time a warm infusion of aromatic plants. He makes use of the same means in dyspepsia and in colics, which take place in cases of difficult menstruation. Dr. Henning has published, in the journal which we have cited, twelve cases in support of this mode of treatment. According to him, the cyanide of zinc will be preferable to the hydrocyanic acid.

CYANIDE OF IODINE.

This new compound of iodine, azote, and carbon was discovered by M. Serullas, (see Annales de Chimie et de Physique, Oct., 1824,) in repeating some of the beautiful experiments of Messrs. Davy and Faraday on the liquefaction of the gases; but he soon found that the combination of iodine and of cyanogen could be effected without the help of pressure.

Physical and chemical properties. The cyanide of iodine, purified by a light sublimation, as we shall show in speaking of the mode of its preparation, is very white; is presented under the form of very long needles, excessively thin; its odor is very sharp; it irritates the eyes vividly and provokes tears; its taste is exceedingly caustic. Its specific gravity is greater than that of sulphuric acid, through which it is precipitated promptly. It is volatilized without being decomposed, at a much higher temperature than that of boiling water. Thrown upon burning charcoal, it gives abundant violet vapor; it is more soluble in alcohol than in water. These colorless solutions have the odor and taste of the substance; they do not redden the tincture of litmus, nor that of curcuma; alone, it does not decompose water. It does not with nitrate of silver produce a precipitate.

Potash, in a concentrated solution, decomposes the cyanide of iodine; a hydrodate and hydrocyanate of potash is formed. The nitric acid does not appear to have any action upon the cyanide of iodine. The sulphuric does not attack until after some time. The hydrochloric acid decomposes it; but it is the liquid sulphurous acid which has the most remarkable action on it; it decomposes it suddenly; the acid is left uncombined. The sulphurous acid gas quite dry does not act at all upon the cyanide of iodine; chlorine has no action on this compound.

Process for obtaining the cyanide of iodine. To produce the combination of the acid and cyanogen, M. Serullas rubs carefully and quickly together in a glass mortar, two parts of the cyanide of mercury quite dry, and one part of iodine also perfectly dried. He introduces the mixture into a phial with a large neck; this he heats then gradually until the cyanide of mercury begins to decompose; crepitation, the disappearance of some violet vapors, and the commencement of a condensation of a white matter at the mouth of the phial are the signs of this. Then it is carried, by means of bent forceps, close to a large glass bell placed on a sheet of paper, or what is better, a square of glass; the bell is raised on one side to introduce under it the neck of the phial, which is inclined, as though in the act of pouring a liquid from it. At the instant, white vapors proceed very rapidly from the phial, and are condensed on the disk of glass, in the form of excessively light cottonlike flakes. When there are no more formed, heat is again applied to pass again under the receiver. This operation may also be done by heating the mixture in a small glass retort, which empties into a small receiver of the same material; but there is some difficulty in extracting the product, and the operator is longer exposed to its emanations, which may prove inconvenient.

We employ, for the preparation of the cyanide of iodine, the iodine and the cyanide of mercury, in the proportions indicated; we avoid the inconvenience of a superabundance of iodine; but it is not less indispensable to go through a sublimation which has for its object the separation of a quantity of the iodine of mercury which is found mixed with it. This sublimation should be made at a very moderate heat. M. Serullas prefers, to fulfil more surely this object, to proceed with the heat of a water bath, notwithstanding the very long time required.

For this purpose, the impure cyanide of iodine is introduced to the bottom of a glass tube, rather wide, so that it may not rest upon its sides; it is kept plunged in a water

bath, the ebullition of which is kept up, so that nothing shall remain in the lower part of the tube but the red iodide of mercury, which is not volatile at that temperature. The tube ought to be a little inclined out of the bath, in order that the cyanide of iodine volatilized may condense in that part which by its position is the coldest.

Composition of the cyanide of iodine. To determine the constituent principles of the cyanide of iodine, the various quantities of this body have been decomposed in the turns of red hot iron. The iodide of iron which resulted, treated by pure potash, produced iodide of potassium, which, after its known composition taking the mean of five experiments, presents for each gramme of cyanide 0,8066 of iodine, which admits the conclusion that a gramme of cyanide of iodine contains, iodine, 0,828—1 atom; cyanogen, 0,172—1 atom.

It is, however, to be remarked, says M. Serullas, that in each experiment the quantity of iodine was a little weaker than it ought to be, from the supposition that there should be in the cyanide an atom of iodine and an atom of cyanogen. However, the difference is not large enough to establish that the body is formed of one atom of iodine and two atoms of cyanogen; for these proportions would be thus: iodine, 0,7062—1 atom; cyanogen, 0,2938—2 atoms.

Action of cyanide of iodine upon man. The cyanide of iodine, says M. Serullas, from its composition, ought to have a very energetic action upon the animal economy, and the medicine will be probably found applicable to it. It does not, however, appear so deleterious as the nature of its elements would lead us to suppose. This distinguished chemist, to whom we owe the elegant work upon the cyanide, tasted it, as well as several persons of his laboratory, who with him have been exposed, as well in preparing it as in enclosing it in vases, to respire large quantities: they only experienced a general lassitude, and always a violent irri-

tation of the eyes, which, however, was dissipated in a little while.

M. Thenard has remitted us quite a large quantity of cyanide of iodine. But we have not yet made any experiments to ascertain the mode of action of this substance; we have pointed out here this compound in order that some one might prepare it, and make some attempts with it.

SOLANINE.

This alkali was discovered by M. Desfosses, apothecary at Besancon, in two individuals of the family of solaneæ, the deadly night shade, solanum nigrum, and the bitter sweet, solanum dulcamara. It exists in these two plants, but the leaves of the last contain a considerable quantity of it, while it is not found in those of the night shade.

Many skilful chemists have treated the night shade and the bitter sweet after the process indicated by M. Desfosses, and have obtained but a little phosphate of lime and vegetable matter, without any vestige of this vegetable alkali. It is essential that M. Desfosses should repeat his experiments, in order to establish anew the fact which he has advanced, or else to point out to what circumstance it is owing that the solanine has not been obtained at Paris.

Preparation of solanine. It is in the berry of the night shade that the solanine is found in the greatest abundance; it exists there in the state of a malate. To obtain it, the filtered juice of these berries is treated with ammonia: by this means the precipitation of a grey deposit is produced. This deposit, received on a filter, washed and treated by boiling alcohol, gives by evaporation the salifiable base, which is hence found sufficiently pure if the berries used have been perfectly ripe. But if the berries are used while yet green, the solanine remains united to a certain quantity of chlorophyle,* which gives much trouble to free it from.

Properties of the solanine. When this substance is perfectly pure, it is offered in the form of an opake white powder, sometimes pearled.

It is without odor, its taste is slightly bitter and nauseous:

[* The green matter of the leaves of plants, soluble in alcohol, ether, oils, and alkalis. *A. T.*]

its bitterness is developed by its solution in acids, and especially in the acetic acid. The salts which it forms with them are uncrystallizable; their solution is transformed by evaporation into a gummy mass, transparent and easy to pulverize.

The solanine is insoluble in cold water, warm water does not dissolve 1-8000, alcohol dissolves a small portion.

Its alkaline properties are little manifest by its action on the curcuma; however, it restores to blue litmus paper reddened by acids; it unites, even when cold, with the acids, and will, when done with attention, give solutions perfectly neutral. Like all the vegetable alkalis, it requires but a very small quantity of acid to saturate it.

Action of solanine upon animals. This substance, introduced in the dose of 2 to 4 grains into the stomach of a dog or cat, excites violent vomiting, soon followed by drowsiness, which lasts several hours.

A young cat was able to support without dying 8 grains of this substance. After violent vomiting, he experienced strong sleepiness, which lasted thirty-six hours.

Action of solanine upon man. If a small quantity of solanine is swallowed, a strong feeling of irritation is perceived in the throat. Held in the mouth, the solanine gives a nauseous taste, slightly bitter, but which becomes very much so if the substance is dissolved in a little acetic acid.

Of all the salts of solanine, the acetate is the only one whose action has been tried on man. In the dose of a quarter of a grain, it produces nausea, but the tendency to sleep is not observable.

After what we have just said, we see that the solanine, like opium, may produce vomiting and sleep; but its emetic properties appear more developed than that of opium, while its narcotic properties are evidently much less.

Cases in which they may be employed. The solanine has not yet been tried upon the sick, but it may be used in cases where the extract of night shade or that of bitter sweet are indicated.

DELPHINE.

This alkali was discovered in 1819, in the seed of the larkspur, delphinium staphisagria, by Messrs. Feneulle and Lassaigne, who gave it that name, derived from that of the family of the staphisaigria, from the opinion that the acrimony peculiar to the plants of that family was owing to this principle; an opinion which there has been no occasion to confirm by the analysis of others of the delphinium.

Preparation of delphine. A portion of seeds is stripped of their envelope and reduced to a fine paste, is boiled in a little distilled water; then passed through a linen; then the decoction filtered. Pure magnesia is then added, and the ebullition continued several minutes. After this, filter anew; the residue, washed nicely, is submitted to the action of highly rectified alcohol. Then evaporating this alcoholic tincture, the delphine is obtained under the form of a white powder, presenting some crystalline points.

Such is the most simple process by means of which it may be prepared. If it is wished to procure a large quantity, as the operation of shelling the grain requires much time and patience, it will be preferable to employ the following means:

The grain is submitted, not stripped but well pounded, to the action of weak sulphuric acid. The liquor is precipitated by ammonia, and the delphine, which contains still a little of the coloring principle, afterwards taken up by alcohol. To purify it, the alcohol is driven off by distillation: the residue is dissolved in hydrochloric acid, and boiled with magnesia. The deposit is taken up by spirits of wine, which gives the delphine perfectly pure.

Properties of delphine. In the state of purity, delphine is presented under the form of a white powder, crystalline when it is moist, but which becomes soon opake by exposure to the air. Its odor is nothing; its taste is very bitter, and then sour.

Water dissolves a very small quantity of it, which can only be recognised by the slight bitterness it receives.

Alcohol and ether dissolve it very easily: the alcoholic solution makes strongly green the syrup of violets, and restores to blue litmus paper reddened by acids.

Delphine forms with the sulphuric, nitric, hydrochloric, oxalic, acetic, &c. acids, neutral salts very soluble, the taste of which is extremely bitter and very sour: alkalis precipitate it under the form of a white jelly.

Cases in which it may be employed. Delphine has not yet been tried as a remedy; but if the staphisaigria has any medicinal virtue, it is presumable that it presides in the alkali which is derived from this plant. It may be employed, therefore, under the circumstances where the larkspur is indicated; and then it is necessary to make use of the salts of this base, by reason of their solubility.

GENTIANINE.

The discovery of this immediate principle presents a circumstance so singular as to merit being related.

M. Henry, chief of central pharmacy, and M. Caventou, were occupied, at the same time, and without the knowledge of each other, on the analysis of gentian.

They arrived at results so much alike, that having communicated their labors to each other, they perceived that they seemed to have acted in concert, and resolved to publish them in common.*

Preparation of gentianine. The powder of gentian is treated with cold ether. After forty-eight hours a tincture is obtained of a greenish yellow; this tincture filtered, poured into an open vase, and exposed to heat, will become by cooling, if the liquor is sufficiently concentrated, a yellow crystalline mass, with a very perceptible smell and taste of gentian.

This mass is treated with alcohol until it ceases taking a citron tinge. The washings are reunited and exposed to a mild heat; the yellow crystalline mass reappears, which, upon evaporation, becomes concentrated, and of a very strong bitterness.

Resumed by feeble alcohol, it is redissolved in part, with the exception of a certain quantity of oily matter.

* This fact is doubly remarkable: first, that it proves how much, within a few years, the means for vegetable analysis have been perfected; secondly, that it shows the changes, which, in consequence of the progress of the sciences, have been effected among those who cultivate them. Such a circumstance, happening a hundred years since, would have excited between two of the learned an obstinate quarrel; now it has produced, between those whom we have mentioned, a sentiment of joy, each seeing his discovery confirmed by that of the other.

This last alcoholic solution, besides the bitter principle of the gentian, contains an acid substance, and the odorous matter of gentian.

By evaporating this liquor to dryness, soaking the matter in water, adding a little washed and calcined magnesia, boiling and evaporating with a vapor bath, the greatest part of the odorous matter of the gentian is expelled, the acidity disappears by means of the magnesia, and the yellow bitter principle remains in part free and in part combined with the magnesia, to which it communicates a beautiful yellow color. Then, by boiling this magnesia with ether, the greater part of this bitter principle is taken up, which is obtained pure and alone by evaporation. If it be wished to separate the greatest part of the bitter principle which remains fixed in the magnesia, and which the ether could not take up, it must be treated with oxalic acid in a quantity insufficient to produce acidity. This acid unites with the magnesia, and sets free the bitter principle, which is retaken by the means already pointed out.

Properties of gentianine. The gentianine is yellow, inodorous, with the aromatic bitterness of the gentian very strong, and which is increased very much when it is dissolved in an acid.

It is very soluble in ether and alcohol, and is separated by spontaneous evaporation, in the form of very small yellow crystalline needles. It is much less soluble in cold water, which it renders however very bitter; boiling water dissolves more.

The dilute alkalis deepen very much its color, and dissolve it a little more than water alone.

Acids lighten its yellow color in a very evident manner. Its solutions are almost colorless with sulphuric and phosphoric acid, and yellowish with acids more feeble, such as the acetic acid. Concentrated sulphuric acid carbonizes it and destroys its bitterness.

Gentianine, exposed in a glass tube to the heat of boiling

mercury, is sublimed in the form of small yellow crystalline needles. One part is decomposed.

Action of gentianine upon man and other animals. Some trials which I made, taught me that gentianine has no poisonous qualities. Several grains of this substance injected into the veins, produced no apparent effect. I myself swallowed two grains dissolved in alcohol, and only experienced an extreme bitterness and a slight feeling of warmth at the stomach.

Mode of employing gentianine. The tincture is the preparation which should be most frequently used.* It may be prepared from the following formula:

Tincture of gentianine. ℞ Alcohol at 24°, 1 ounce,
Gentianine, 5 grains.

This tincture replaces with success the elixir of gentian, and is employed in the same circumstances.

Syrup of gentianine. ℞ Syrup of sugar, 1 pound,
Gentianine, 16 grains.

This is one of the best bitters which can be used in scrophulous affections.

[* We doubt very much the propriety of this remark. Gentian is a medicine most used in dyspepsia and other debilitated states of the stomach, when the use of alcohol is highly improper, and tends rather to increase the disease; for which reason tinctures of all kinds should be avoided. The form of pill is the best, for which this alkali is very valuable. *A. T.*]

IODINE.

Iodine is a simple body, discovered in 1813, by M. Courtois, in the mother waters of the soda of sea weed; but it is M. Gay Lussac who made known to us the most of its properties. This body is met with in most of the fuci which grow upon the sea shore, and also, according to M. Fife, in sponges, (Annales de Chim. et de Phys., tom. 12, p. 405.) M. Gaultier de Claubry (Annal. de Chim., tom. 98, p. 75) has ascertained that iodine exists in the mother waters of the soda of sea weed in the state of hydriodate of potash. Several mineral waters appear to owe to it their properties. M. Laur Angelini, apothecary at Voghera, has proved, by means of starch, the presence of iodine in the salt waters of Voghera, but without making known more particularly his process. This same chemist recognised also the presence of iodine in the waters of Salles, in Voguerais, waters which are regarded as efficacious against goitre and lymphatic obstructions. Dr. Cantu, professor of chemistry at Turin,* astonished at the wonderful effects of the sulphurous waters of Castle Nuovo of Asti, in the same complaints, searched, at first without success, for iodine in those waters. Encouraged by the new researches of M. Angelini on the waters of Sales, he has arrived at the discovery of iodine in those waters. M. Cantu is led to think that iodine exists in all sulphurous waters which contain chlorides. Different mineral waters, not sulphurous, particularly those of Echaillon, in Savoy, which gives a twelfth of its weight of marine salt, and the efficacy of which against goitre is known, have not given any trace of iodine.

M. Balard,† preparator to the faculty of sciences at Montpel-

* Memoire della reale Acad., delle Scienze di Torino, tom. 29, p. 221.

† Annales de Phys. et de Chim., Feb. 1825.

lier, in modifying the use of starch as a reagent for iodine, has attained to the establishing of the existence of this body in various marine molusci, bare and shelled, such as the doris, the venus, oysters, &c., several polypi and marine vegetables, the gorgonia, the zostera marina, and especially in the mother waters of the salt pits supplied by the Mediterranean.* He could not ascertain in what state iodine exists in salt water on account of its small quantity; but he supposed that it was in the state of hydrodate.

M. Vauquelin has just found iodine in combination with silver in a fragment of mineral, coming from a mine near Mexico, the locality of which is not well determined.

Physical and chemical properties of iodine. The name was given it from the Greek word ιωδης, violet, on account of the color which it presents when in a state of vapor. At the ordinary temperature iodine is solid; it presents under the form of small grey scales of feeble tenacity and having the aspect of plumbago. It melts at the temperature of 170°, (370°;) it volatilizes at 175° (379°,) expanding into beautiful violet vapors. These vapors, enclosed in a receiver, are condensed into new crystalline scales.

Iodine is soluble in ether and spirit of wine; the latter dissolves more or less of it according to its degree of rectifica-

* As the processs of M. Balard is very simple and ingenious, we will point it out in a few words. After having mixed the liquor which contains the iodine with starch and sulphuric acid, slowly pour over it a small quantity of an aqueous solution of chlorine; this liquid, from its less specific gravity, does not mix with the preceding, and, at the part where they touch, a blue zone manifests itself, which, however feeble it may be, cannot be mistaken. If the vase is lightly agitated, so as to mix a part of the inferior liquid with the solution of chlorine which swims on top, the blue tint is developed in the part with which the chlorine is in contact; but if the whole is agitated together, and the two liquors completely mixed, the blue color disappears immediately if the chlorine was in excess.

tion; at 35°, and at the temperature of 13°, (56°,) it dissolves about 1-9 of its weight. At 40° of concentration, and at the same temperature, it dissolves 1-6; water only dissolves 1-700 of its weight of iodine.

Iodine possesses the property of forming an acid with hydrogen and one with oxygen.

We cannot combine iodine with oxygen in the gaseous state; but it unites with oxygen in the naissant state of gas, and forms the iodic acid.

Iodine has great affinity for hydrogen, which it takes from a great number of bodies, and which it absorbs in the state of gas at an elevated temperature: it forms with this gas the hydriodic acid, composed only of iodine and hydrogen. This acid presents under the form of a colorless gas, quite sapid and of very sharp odor, reddens strongly the tincture of litmus, and extinguishes bodies in a state of combustion.

This gas is absorbed very rapidly by water, which dissolves a very large quantity of it; it also diffuses through the air white fumes, by seizing upon the aqueous vapors which are contained therein.

The hydriodic acid may be obtained by pouring water upon an iodide of phosphorus, made with 8 parts of iodine and 1 of phosphorus, and distilling the liquor. The first part that passes is, we may say, only water; the last, on the contrary, if it is collected separately, is very concentrated, and expands through the air thick fumes; it is hydriodic acid. The phosphoric acid, which is likewise formed, remains at the bottom of the retort.

The hydriodic acid may be united to a great number of bases; it forms with some neutral salts, of which the hitherto most employed in medicine is the hydriodate of potash; the hydriodate of soda has also sometimes been employed, and with the same appearance of success.

Preparation of iodine. Iodine is extracted, as we have said, from the mother waters of the soda of sea weeds, where it exists in the state of a hydriodate of potash.

These waters are obtained by burning the different fuci which grow upon the sea shore in Normandy, washing the cinders, and concentrating the liquor.

To obtain the iodine, an excess of concentrated sulphuric acid is poured into the waters, and the liquor boiled by little and little, in a glass retort fitted with a receiver. The sulphuric acid unites with the base of the hydriodate and the hydrogen of the hydriodic acid, so that there results sulphate of potash, water, sulphurous acid, and iodine, which last evaporates in the form of violet vapors, passes into the receiver with a little acid, and is condensed in that state. To purify it, it is necessary to wash it, to mix it with water containing a little potash, and to distil anew.

Preparation of the simple hydriodates of potash and soda and iodide. If upon iodine in a metallic state is poured a solution of soda or potash, there are formed an iodate and an hydriodate, which are separated one from another by means of alcohol, which only dissolves the latter of these salts; the pure hydriodate is obtained by evaporation.

The hydriodates of soda and potash may also be obtained in the same manner as the other neutral hydrates, that is to say, by combining directly the acid with the oxide.

The hydriodates of soda and potash are deliquescent salts, consequently very soluble in water. Their solution is still susceptible of dissolving iodine, and thus forming an iodurretted hydriodate.

Messrs. Baup (Naturwis Anzeigir, 1821) and Caillot (Journal de Pharmacie, Oct., 1822,) the first chemist at Vevay, and the other at Annecy, have found, each in his own way, the same process for obtaining the hydriodate of potash, by means of the hydriodate of iron.

It consists in this: introduce into a phial or into a matrass 1 part of iodine and 3 to 4 parts of water; add by little and little, and at intervals, an excess of scales of pure iron, 1-2 part, for example. The combination takes place immediately; much heat is disengaged, the iodine disappears, and the

liquid is colored a deep red. During this quick reaction there is formed an ioduretted hydriodate: by heating slightly, and shaking it a moment while it is warm, it is converted into a simple hydriodate of iron. We ascertain, by the almost entire discoloration of the liquid, that the action has ceased; but more surely when white paper is no longer tinged red. The liquor is filtered, diluted with several parts of water, carried by the sand bath, in a capsule or matrass, nearly to the point of ebullition: then the iron is precipitated by means of the pure carbonate or subcarbonate of potash. This part of the operation requires some attention not to add an excess of potash, which may be, it is true, separated by repeated crystallizations, or saturated by hydriodic acid. After having filtered to separate the ferruginous deposit, and washing it well, proceed to the evaporation of the filtered liquid, commencing with the wash waters. The salt may be made to crystallize by cooling it, or by evaporation; in the latter case, the concentrated solution of hydriodate of potash is not to be placed in a stove, because the salt would rise on the sides of the vase and would finish by drawing off all the liquid, but on a slow fire, where the borders of the vase, being less heated than the bottom, would condense a little of the vapor that is raised, which prevents thus the ascension of the salt. By little and little the crystals are deposited; when they fill nearly all the space occupied by the liquid, it is left to cool, then the mother waters drained off, which ought to be evaporated in order to procure more of the salt; finally, the crystals are entirely dried on a stove or on the fire, where they will undergo a light decrepitation.

To obtain this salt perfectly pure, it is necessary to submit it to new crystallizations, especially if the potash has been added in excess. If the iron employed was a little coppered, it will be sufficient to pass through the mother waters a few bubbles of sulphuretted hydrogen, and to filter before proceeding to new crystallizations.

The hydriodate of potash (iodide of potassium) crystallizes ordinarily in cubes; by a careful evaporation it crystallizes in measures more or less wide. These crystals are almost always opake or of a milky white. By the gradual cooling of a solution little concentrated, M. Baup obtained it crystallized in long quadrangular prisms, and also in short prisms, terminated by a pyramid with four sides.

The solubility of the iodide of potassium at 18° (64°) has been determined by M. Gay Lussac: 100 parts of water at this temperature dissolve 143 of this iodide. M. Baup has found that the same quantity of water at 12° 5′ (55°) dissolves 136, and at 16° (61°) 141 parts.

It requires 5 1-2 parts of alcohol, specific gravity = 0,85, at 12° 5′, and from 39 to 40 of absolute alcohol, of the same temperature, to dissolve 1 of iodide of potassium; in both cases it dissolves much more warm than cold.

Ioduretted hydriodate of potash. M. Baup has found that the ioduretted hydriodates were combinations of fixed and determined proportions, so that the solution of hydriodate of soda, or potash, which is known to be susceptible of still dissolving iodine, can, whatever may be otherwise the circumstances, be combined with a quantity of iodine equal to that which it contains itself, (nearly 3-4 of its weight, or :: 76,5 : 100.)

Hitherto only the ioduretted hydriodate of potash has been employed in medicine, ordinarily dissolved in water: the simple hydriodate is preferable to it.

Action of iodine upon man and other animals. A little while after the publication of his handsome work on iodine, M. Gay Lussac sent me a certain quantity, in order that I might study its effects upon animals. I made immediately some experiments, in which I introduced the tincture of iodine into the veins, in the dose of 1 gros, without any apparent effect.

I made also several dogs swallow it, who vomited, but experienced no other effect.

Seeing this innocuity of the new substance, I swallowed myself a tea spoonful of this tincture, and there resulted nothing but a disagreeable taste, which remained several hours, but finally dissipated by little and little.

I have seen lately an infant four years old, to whom, by mistake, was given a tea spoonful of the tincture prepared by M. Pelletier; its lips and tongue were colored yellow, but no accident followed this event.

Besides the therapeutic properties of iodine, one of its most remarkable effects, when the employment has been continued for some time, is the diminution of volume of the mammary glands in woman and of the testicles in man.

Cases in which the preparations of iodine are employed. M. Coindet, physician at Geneva, is the first who employed the iodine as a remedy; he used it in the treatment of goitre with very marked success. These attempts have been repeated since, as well in France as in Swisserland, by several physicians; and it seems to result, from their observations, that we have now in iodine an efficacious remedy against a disease which has sometimes shown itself so obstinate.

Although we ought especially to expect success from the employment of iodine when the goitre is recent, and in individuals who have not yet reached an advanced age, however, we have seen it dissipate old goitres, hard and voluminous; but, as in this case the treatment is necessarily longer, there may result from the long continued use of iodine an action injurious to the stomach: to remedy this inconvenience it has been sought to introduce iodine by another way, by that of frictions.

If new examples were necessary to prove to practitioners at this time the advantage of simple remedies over ancient formulas, we could cite the cases collected by Mr. William Rickwood, of goitres cured by iodine, while we have before used burnt sponge, but with only a partial success. (Lond. Med. and Phys. Journal, Aug., 1823.) Among the facts reported by this physician there is a curious one; it is the

cure of a goitre, or at least a very considerable diminution of one, in a female aged 70 years.

Iodine has been employed in the treatment of scrophula with an equal appearance of success: a great number of cases have just now confirmed the utility of this remedy in that disease. M. Baup has cured, by the use of iodine, old scrophulous ulcers. I have myself obtained, by this means, the resolution of very considerable glandular enlargements.

In the report on the Polyclinic Institute of Berlin, for the years 1820, 21, and 22, Messrs. Hufeland and Osann, after having reported several cases of goitre cured by the tincture of iodine, and the hydriodate of potash, announce that some advantage has also been drawn from the same preparations of iodine, over scirrhus and carcinoma of the uterus. Dr. Wagner asserts that he has obtained good effects from iodine in the treatment of a tumor which he regarded as cancerous, and which was situated near the jaw. Doctor Hennemann (Journal der pratischen heis Kunde) has also reported a case in which it seemed in fact that iodine had had a remarkable influence on a cancer of the womb arrived at the last stage; there was a communication between the vagina and the abdominal cavity, so that a cure could not take place; but the cancerous affection, says Dr. Hennemann, was much ameliorated.

M. Zinck, in 1823, read to the National Society of Lausanne, a memoir in which he reports two cases of white swelling cured by the preparations of iodine.

In the memoir of M. Gairdner on iodine, there is found a similar case of cure, which was communicated to him by Prof. Maunoir, of Geneva. A child had a considerable white swelling of the knee. There was incapacity to walk without crutches: blisters, leeches, and resolvents of all kinds had been employed; friction was made morning and night on the tumor with a portion of iodine ointment as large as a nut; the tincture of iodine in the dose of 1-2 a

gram at most was given internally. After some time the cure was complete.

M. Zinck has again published two memoirs (Journal Complementaire, April and May, 1824) upon the abuse of iodine used internally, in which he has shown that the action of iodine prolonged for too long a time may bring on inflammation of the stomach; but this accident has only taken place from the abuse which the patients made of it from the hope to obtain a more prompt cure, or even to prevent the evil.*

Lately the use of iodine has spread in England, where it has been used but by a very small number of physicians. Dr. Gairdner has published an interesting memoir on the effects of iodine upon the animal economy, and on the advantages to be derived from it in the treatment of goitre, scrophula, and tuberculous affections of the lungs and abdomen. We would observe that it is very rare that iodine causes the serious accidents that are attributed to it by Dr. Gairdner: it is necessary that it should be administered with

* The following is the literal passage from M. Zinck's memoir: As soon as the tincture of iodine was indicated for the cure of goitre, the use of it was inconceivable at Lausanne; it was carried so far, that I might say without exaggeration, that the bottle of tincture of iodine was put in the place of the sweetmeat box; for I have seen persons carry it with them: with very few exceptions every one used it; even those who feared that the goitre might take place hereafter, and the apothecaries gave out the remedy without a prescription from a physician. I have calculated with M. Bischoff, apothecary of our village, that, keeping within bounds, we might state 10 pounds of iodine (more than 20 troy) at least has been used to make the tincture which he sold the first year, and the other apothecaries sold as much. Many persons came to Geneva thinking very erroneously that it would be better. This mania to take iodine has caused victims; but we had few in comparison to the great number of individuals who made use of the tincture without any kind of caution, and those who have fallen a sacrifice were those who abused the dose.

as little rule as it was by the young students of whom the author speaks, who wished himself to cure his sister of a goitre which she had. Dr. Baron, of London, appears to have administered iodine with some success in the treatment of scrophulous phthisis, and some other tuberculous affections. These first attempts require that we should collect new facts, that we may know to what point we may calculate upon the efficacy of iodine, when phthisis is but little advanced.

The late Mr. Haden, in his English translation of our Formulary, has also reported a case of phthisis, presumed cured by iodine.

M. de Fermon obtained very good effects upon a young woman with phthisis, by the following potion, which was taken a tea spoonful at a time every hour.

℞ Lettuce water,	4	ounces,
Solution of hydriodate of potash,	15	drops,
Medicinal prussic acid,	10 to 15	drops,
Syrup of marshmallows,	1	ounce.

Or the prussic acid and the syrup of marshmallows may be replaced by cyanic syrup.

This same Dr. Baron, whom we have just cited, reports in his Treatise on Tuberculous Diseases,* a case of encysted dropsy of the ovary, in which the use of iodine was followed by the most prompt and most marked success. Dr. Gairdner, who cites this fact in his memoir upon iodine, and says that he had also advised it with great success in a similar case, prescribed it in several cases of acites, but obtained no good effect.

M. Coindet praises iodine as a powerful emmenagogue: this last property has been confirmed by the observations of

* Researches, observations, and experiments on the natural and artificial developement of tuberculous diseases, &c., translated from the English of Sir John Baron, physician of the hospital of Gloucester, by M. V. Boivin, Paris, 1825.

Prof. Brera (Saggio Clinico sull' Iodio, Padoue, 1822) and of some other physicians.

M. Brera has even administered the preparations of iodine in the treatment of a much larger number of patients than M. Coindet has. To the cases of goitre and suppression of the menses cured by iodine, he has joined several cases of glandular indurations, tabes mesenterica, chronic dysentery, hemoptysis succeeding suppression of the menses, laryngeal phthisis, fluor albus, syphilitic enlargements, the cure of which he attributes to this same remedy. It may be that M. Brera too often joined other substances with the preparations of iodine, to which last he attributes the efficacy. We must not, therefore, employ these but with caution in similar cases. Further, M. Brera is not the only one who has given iodine for tabes mesenterica. M. Callaway, a distinguished English surgeon, has derived from the use of tincture of iodine the most happy results in scrophula and in enlargements of the mesenteric glands.

Iodine has been used lately for the treatment of syphilitic bubos and of blennorrhagia.

M. Richond, (Archiv. Gen. de Med., March, 1824, p. 322,) military physician of the hospital of Strasbourg, employed it with advantage in the treatment of these two diseases.

This physician gives generally in the morning 15 drops of the tincture, 20 to 25 the second and 30 the third day. He commences, then, to give 15 drops at night, and augments in that way up to 30 drops morning and night. This dose is continued three or four days: finally, he carries the dose to 50 and 55 drops morning and night. If there be no irritation of the stomach, the patients experience sometimes a sentiment of burning in the pharynx; but this sensation soon dissipates: there are at times slight colics, headache, dryness and redness of the tongue; then suspend it for a short time. The dose most proper is 30 drops morning and night. M. Richond has only treated soldiers thus, the most part robust and little excitable.

Messrs. Gimelle (Revue Medicale, v. 7, p. 249) and Sablairolle* have reported cases which will confirm the properties which Messrs. Coindet and Brera attribute to iodine against leucorrhœa. M. Gimelle has even cured dartres, by means of preparations of iodine. M. Eusebe de Salle has treated with success, by frictions of ointment of hydriodate of potash and iodine in pills, chronic enlargements of the testicles and chronic enlargement of the liver, which the English call "liver complaint," and which arise from the residence of Europeans in equatorial countries.

A veterinary physician, M. Roupp, attached to the depot of stallions at Abbeville, wished to make use of the hydriodate of potash in the treatment of the glanders: he gave from 9 to 14 grains of the hydriodate of potash, for a month, to a horse, and had him rubbed with an ointment made with this salt. This first attempt was without effect; it seemed even to augment the fever: perhaps the dose was too powerful. In the animal there was a too considerable disorganization of the lungs, of the pituitary membrane and of the bones which it covered, to hope for a cure. (Jour. Gen. de Med., April, 1824.)

At the end of the year 1822, the Geneva and Swiss physicians were much out of conceit of the advantages which they had at first thought to have reaped from the preparations of iodine: they pretended that serious accidents had followed their use, such as chronic inflammation of the stomach, and considerable and rapid diminution of all parts of the body, particularly of the breasts. We have given the reason of it. I have never seen such accidents, at least if the doses have not been too large; but this is no small reason to be very circumspect in employing the new preparations.†

* Journal Univ. des Sciences Medic., Oct., 1823, p. 124, and Bulletin des Sciences Medic., Feb., 1824.

† Perhaps, too, these accidents have been owing in part to this: that at Geneva and in France, where the preparations

Mode of employing iodine.

Tincture of iodine. ℞ Alcohol at 35°, 1 ounce,
Iodine, 48 grains.

This tincture should not be prepared long before it is used, because it soon deposits the crystals of iodine; there is reason to fear, besides, that the iodine might deprive the alcohol of part of its hydrogen, and thus be converted into iodurctted hydriodic acid.

The tincture of iodine has been used with much success in the cure of goitre; it has also been employed in the treatment of scrophula, but not so often as the two following preparations:

The tincture of iodine is given to adults in the dose of 4 to 6 drops, three times a day, in a half glass of sugar and water; it may be augmented progressively up to 20 drops, three times a day; 20 drops contain 1 grain.*

Iodurctted sulphuric ether.

℞ Sulphuric ether, 1 grain,
Pure iodine, 6 grains.

of iodine were first made use of, it was indicated for the tincture to use 48 grains to an ounce of alcohol; but the grain intended was poids de marc, while in other parts of Swisserland and in Germany the medicinal weight of Nuremburg was intended, and in England the troy weight: the division of the scruple by that is into 20 grains, while it is into 24 by the pois de mare; so that, in the largest part of Swisserland, in Germany, and in England, a tincture of iodine was prepared stronger by one fifth than that which was ordered, and it was administered in the same dose. (Journal de Pharmacie, Jan., 1823, p. 37.)

* A drop of the tincture of iodine only weighs 3-4 of a grain, while the drop of the solution of hydriodate of potash weighs more than a grain. If the hydriodate is iodurctted, the weight of the drop may be 1 1-2 grain to 2 grains. It is necessary to recollect this difference, when the dose is indicated by the number of drops.

Thirty drops contain 1 grain of iodine. Patients hardly support more than 10 drops at a time.

Solution of hydriodate of potash.

℞ Hydriodate of potash, 36 grains,
Distilled water, 1 ounce.

This solution is still capable of dissolving iodine, and thus to form an ioduretted hydriodate of potash.

If it is wished to make a solution called Coindet's, it is sufficient to add 10 grains of pure iodine to the solution of hydriodate of potash indicated above.

These two preparations, the mode of administration of which is the same as that of the tincture of iodine, are employed like that in the treatment of goitre and scrophula; in the latter case there is usually associated some medical tonic.

Ointment of hydriodate of potash.

℞ Hydriodate of potash, 1-2 gros,
Ungt. simplicis, 1 1-2 ounce.

The dose of this ointment, which is used in friction, morning and evening, in goitre and enlarged scrophulous glands, is a demigros for each time. In about eight days it may be carried to 1 gros, and even more, according to the age of the subject and the extent of the tumor.

Sometimes, by this means, a complete resolution is obtained of tumors which the saline solutions have not entirely dissipated. This ointment has been employed in divers cases of enlargement of the testicles, which have not yielded to the influence of other means; sometimes, also, the treatment by frictions does not produce a complete cure, and often it is necessary to combine the two means. In general, in the treatment of scrophula, more advantage seems to be derived from the use of saline solutions.

When the method of friction is used in the treatment of goitre, it is well, sometimes, to aid the action of iodine by emollient fomentations or leeches. Sometimes, after the first frictions, the goitre, so far from softening, becomes hard, and slightly painful; the application of a few leeches ordi-

narily causes this local irritation to disappear, and the effects of iodine are then shown in a very marked manner.

This ointment may be made more active by adding 10 or 15 grains of pure iodine, which forms what is called the ointment of ioduretted hydriodate of potash.

Ointment of iodide of zinc. Dr. Ure, (Dictionary of Chemistry, 2d ed.,) to replace in some cases the ointment of the hydriodate of potash, advises the use in frictions of the following composition:

℞ Iodide of zinc, 1 drachm,
Ungt. simplicis, 1 ounce,

Frictions with 1 drachm may be made on the tumor, once or twice a day.

IODIDE OF MERCURY.

The iodide of mercury has recently been employed against syphilis: as we have not ascertained the medicinal properties of this new composition, we shall limit ourselves to point out here its mode of preparation, and the different forms under which it is administered.

Mode of preparation of the protoiodide of mercury. 100 parts of crystallized protonitrate of mercury are taken, which are dissolved in 400 parts of water. Into the solution filtered is poured a solution of the hydriodate of potash, which is added until a precipitate is no longer formed. A yellowish green precipitate is then obtained, which is pulvurulent; it is thrown upon a filter; washed nicely with distilled water, until the water which passes no longer precipitates black with potash; it is dried and preserved in a vase secured from the rays of light. This protoioduret is yellow, insoluble in water, and without action on itself: it is volatile. According to M. Thompson, 162 parts of protoiodide contain 62 parts of iodine and 100 of mercury, or 250 of mercury to 156 of iodine.

Mode of preparation of the deutoiodide. The deutoiodide is prepared with the deutochloride of mercury (corrosive sublimate;) 70 parts of this salt with 100 parts of hydriodate of potash. Each compound is dissolved separately in a sufficient quantity of distilled water; the two liquors are filtered and united in small portions; a red powder is immediately precipitated, which is collected on a filter and washed with distilled water with the greatest care, until the water which is passed the filter has no longer any taste.

The precipitate is dried and reduced to powder, and put into a bottle secured from the rays of light. The deutoiodide is very soluble in the hydriodate of potash, and in mercurial salts, so that it is not necessary to put one or the other in excess; the acids and even alcohol also dissolve this

precipitate. The deutoiodide contains 250 parts of mercury and 312 of iodine.

In the preparation of these iodides the hydriodic acid may be substituted for the hydriodate of potash.

Mode of employing the iodide of mercury.

Ointment of protoiodide of mercury.

℞ Protoiodide of mercury, 20 grains,
Ungt. simplicis, 1 1-2 ounce.

This ointment has been extolled in the treatment of inveterate venerial ulcers, which it is said to accelerate the cicatrisation of.

Ointment of deutoiodide of mercury.

℞ Deutoiodide of mercury, 20 grains,
Ungt. simplicis, 1 1-2 ounce.

This ointment is more active than the preceding, and is employed in the same way; a very small quantity is to be put upon the dressings which are placed upon the ulcers.

Alcoholic solution of the deutoiodide of mercury.

℞ Alcohol at 36°, 1 1-2 ounce,
Deutoiodide of mercury, 20 grains.

Twenty-six drops of this solution correspond very nearly to 1-8 of a grain of the deutoiodide of mercury; it is given in 10, 15, or 20 drops in a glass of distilled water; the common water decomposes it readily.

It is said to have succeeded very well in scrophulous affections complicated with syphilis.

Sulphuric etherial tincture of the deutoiodide of mercury.

℞ Sulphuric ether, 1 1-2 ounce,
Proto or deutoiodide of mercury, 20 grains.

This preparation, more active than the preceding, must be given in small doses.

Pills of deutoiodide of mercury.

℞ Deutoiodide of mercury, 1 grain,
Extract of juniper, 12 grains,
Powdered liquorice, q. s.

Divide into 8 pills, 2 at first to be taken morning and night; afterwards to be increased to 4.

Pills of protoiodide of mercury.

℞ Protoiodide of mercury, 1 grain,
Extract of juniper, 12 grains,
Powdered liquorice, q. s.

Divide into 8 pills, 2 at first to be taken morning and night; afterwards to be increased to 4.

LUPULINE.

The existence of this substance in the hop has just been made known, by Dr. Ives of New York. It has been since described in France by M. Planche, and more recently by Messrs. Chevalier and Payen, under the name of yellow matter of the hop.

It presents under the form of small yellow brilliant grains, which cover the base of the scales of the hop.

It is of a golden yellow, pulvurulent, and of an aromatic smell.

Submitted to analysis, it has been found essentially composed of a resin, volatile oil, and a bitter principle. It is this latter principle for which the name of lupuline should be reserved. It has a very bitter taste, and is soluble in water, alcohol, and ether, to which it communicates its bitterness.

Action upon man and other animals. Dr. Ives regards it at the same time as aromatic, tonic, and narcotic.

I have found nothing very precise in this respect. I have made several attempts both with the lupuline in substance and different preparations of it, upon animals, and have not found it was narcotic. This property, nevertheless, is the easiest to ascertain in experiments upon animals.

Mode of employing lupuline.

Tincture of lupuline. ℞ Lupuline, 1 part.
White powdered sugar, 2 parts.

Rub the lupuline first in a porcelain mortar, and add the sugar by little and little. Mix exactly.

Lupuline pills. ℞ Pound strongly and divide into pills.

This substance is taken in bulk, which dispenses with the addition of a base.

Tincture of lupuline. ℞ Lupuline contused, 1 ounce,
Alcohol at 36°, 2 ounces.

Digest for six days in a close vessel, pour off, press strongly, filter, and add sufficient alcohol at 36° to obtain 3 ounces of tincture.

Extract of lupuline. This extract may be prepared either by aqueous infusion; it is then bitter and aromatic; or by decoction, when it is equally bitter, less aromatic, and retains some resin.

Syrup of lupuline.

℞	Alcoholic tincture of lupuline,	1 part.
	Simple syrup,	7 parts.

When the tincture of lupuline is mixed with the syrup, it is separated in a state of extreme division, and gives to the syrup the appearance of an orgeat. It is necessary to recommend to the patient to shake the bottle well when it is taken.

The doses of these preparations are not yet fixed in a precise manner; but the lupuline not having any poisonous quality, practitioners can easily determine them themselves.

OIL OF THE CROTON TIGLIUM.

This oil is taken from the seeds of the croton tiglium, a dwarf tree of the family of the euphorbium, which grows in the East Indies. After the recent researches made by M. Caventou, it appears very certain that the croton tiglium is the same tree which produces the seeds known in commerce under the name of pignon d'Inde, which Messrs. Pelletier and Caventou analyzed in 1818, under the name of jatropha curcas. M. Caventou has supported this opinion by chemical experiments, which have proved to him that the oil taken from the pignon d'Inde differs in nothing from the oil of croton obtained directly from London. In fact, the same odor, the same taste, same color, same manner of acting on chemical reagents; finally, the same energy in their therapeutic action, according to the experiments made in the hospitals by Messrs. Recamier, Bally, and Kapeler. It is cultivated in Malabar, at Ceylon, and in the Molusca isles, on account of their medicinal properties. It is many years (in 1630) since the croton oil was introduced into Europe; it was even employed in the interior with success by several physicians. In 1632, Artus Gyselius boasted of the use of this oil in dropsies. In the Herbarium Amboinensis of Rumphius, published at Amsterdam, in 1750, by Burmann, is found a description of the croton, the seeds of which furnish, by pressure, says the author, an oil which, taken in the dose of one drop, in Canary wine, was then a usual purgative. In our time this remedy had entirely been forgotten in Europe, when M. Conwel, physician in the service of the English East India Company, at Madras, has recalled attention to this oil, which is used generally in India, and the use of which has been introduced into England.

Mode of preparation. The mode of preparation followed in India to obtain the oil of croton, is not known; it appears,

however, that it is by expression or ebullition, according to the experiments of M. Caventou, given hereafter. By digesting in sulphuric ether 100 parts of bruised kernels, placing the whole on a filter covered with care during the filtration, and washing the remainder with a sufficient quantity of ether, M. Nimmo, of Glasgow, found that 4 parts remained and 60 parts were dissolved.

By this process, of 300 grains, (from which we must deduct 108 for the envelope, leaving 192 for the kernel,) he has obtained two drachms of an oil which presented the taste and medicinal properties of ordinary croton oil.

An alcoholic solution of croton may be prepared, either by pouring alcohol on the grains, or on the oil itself: but M. Conwel does not point out, in the thesis which he supported before the faculty of Paris, the proportions with which this solution should be made, which possesses the same properties as the oil: it appears that that which he prepared was much less active than the oil, for he gave it in the dose of a drachm. According to M. Nimmo, the activity of the oil of croton is owing to a sharp resinous principle, soluble in ether, alcohol, and the fixed and volatile oils. According to the experiments of this physician, 100 parts of the kernels of the croton tiglium contains, acrid principle, 27; fixed oil, 33; farinacious matter, 40. 100 parts of the croton oil contains, acrid principle, 45; fixed oil, 55—100.

Messrs. Pelletier and Vauquelin have made some experiments to separate the active principle of croton oil; but have not yet succeeded.

M. Caventou has extracted the oil of the croton tiglium, by means of the action of alcohol at 38° upon the kernel of the seed reduced to paste. He left it to macerate forty-eight hours and filtered: he added a second and a third portion of alcohol to the paste already drained; and submitted this to a strong pressure. He reunited the alcoholic macerations in the water bath of an alembic, and submitted them to distillation to draw off the alcohol, which might serve for another

operation. The oil which remained in the water bath is filtered through a Joseph paper, and preserved in a bottle with a glass stop.

The quantity of oil obtained, with respect to the kernels, was 50 per cent.

According to the researches of M. Caventou, it appears that the jatrophic acid cannot be the principle in which the drastic virtue of the oil resides.

Action of croton oil upon man and other animals. Croton oil is of an orange yellow; it has a very peculiar smell, sui generis; its taste is excessive acrid and pungent, like that of cinnamon; it has also a little the taste of common oil ricini. When a drop is put upon the tongue, a few moments after a disagreeable sensation of heat is perceived, which extends to the back part of the throat: this sensation lasts several minutes: to dissipate it, one or two spoonfuls of cold water may be taken; nevertheless, it may be considered as an obstacle to the administration of pure croton oil. M. Conwel having sent me last year a certain quantity, I commenced by trying its effects upon animals. I first ascertained that this oil is purgative in an infinitively small dose, as, for instance, a drop or half a drop. In a larger dose, this oil became strongly drastic; it determined a violent inflammation of the intestinal canal, accompanied with repeated vomitings and continual dejections.

Injected into the veins it produced also, according to the dose, either simple purgation, or inflammation of the intestinal canal, or even the death of the animal.

Enlightened by these effects, I did not hesitate to employ the croton oil as a remedy; I gave it, at the Hotel Dieu, at Paris, to several patients, men and women, confided to my care: the results could not be more satisfactory. One or two drops mixed in half an ounce of syrup purged gently and abundantly about fifteen patients placed under different circumstances. The effects appeared so advantageous, that several students of the hospital desired to try the oil on them-

selves, and several used it with advantage, and expressed to me their satisfaction.

I have employed several times in my private practice the oil of croton tiglium, and always without accident.

Although I have never observed any inconvenience, I ought to say that M. Conwel has seen several experience nausea and vomiting. When the vomiting took place the purgative effect did not occur.

M. Conwel says that the odor of oil of croton, respired several times, from a bottle of six ounces, was sufficient to purge a young girl;* and an adult having made the same attempt, only experienced some nausea.

The effect of the croton oil is very rapid: it takes place often in about half an hour. Besides the alvine evacuations, the secretion of urine appears considerably augmented.

Drs. Recamier, Kapeler, and Bally have made numerous experiments with croton oil prepared by M. Caventou; they have always observed that 1 or 2 drops were sufficient to produce twelve, fifteen, or twenty stools. They have seen, nevertheless, that it offers the inconvenience of exciting vomiting, like that which comes from England.

Cases in which it should be administered. The croton oil may be used as a common purgative, when there exists no sign of irritation in the stomach or intestinal canal; in old men, in the same circumstances as for veratrine; but the croton oil ought, moreover, to be preferred, when ordinary purgatives have been administered without success, in apoplexies, and in dropsies; finally, when there exists mechanical or other obstacles to the employment of an ordinary medicine, and especially when it is necessary that the effect should be rapid.

* [A gentleman who imports this article from France, while unpacking it, together with a young man, his clerk, was exposed to the odor of it, which had such an effect upon their bowels as to produce continued alvine evacuation, which lasted for some time. *A. T.*]

Dr. Ainslie, physician at Madras, published in that city, in 1813, a work on the materia medica, in which he recommends the external use of croton oil in rheumatic affections.

Dr. Kinglake cites several cases of obstinate constipation, which he cured by the aid of only 1 drop of croton oil, given in the form of pill. He cured in particular, in this manner, an individual seized with painters colic. (Bulletin of Medical Sciences, Feb., 1823, p. 145.)

Mode of employment. It is given 1, 2, or 3 drops at most, in a half ounce of gum or other syrup.

M. Conwel also advises the following formula:

Alcoholic solution, 1-2 gros,
Syrup simp. and muc. gum arabic, each 3 gros.

We have already said that M. Conwel does not indicate in what proportion the active principle enters in the alcoholic solution which he employs, so that it would be well, until we are better informed, to continue the use of the simple croton oil; nevertheless, it is probable that it is prepared by saturation.

This oil is also employed in frictions around the umbilicus. According to M. Conwel, 4 drops applied in this manner have produced a purgative effect. A slight eruption follows the use of this method.

Soap of croton oil. The therapeutic administration of this oil presents inconveniences with regard to the exact determination of drops. M. Caventou has prepared a soap with the base of soda, which has been emplyed with great success by Dr. Bally.

Mode of preparation. This soap is prepared cold, by triturating two parts of oil and one part of lie called soap maker's lie. When the combination has acquired consistence, it is poured into pasteboard moulds, and, after a few days, it is cut off in slices, which are preserved in a large mouth phial, well stopped.

Mode of employing it. Dr. Bally has given this soap in the dose of 2 or 3 grains, dissolved in a little water, or in

sugar, or in pills; the effect is the same as that of the oil of croton.

[I have used this by mixing 8 drops of the oil with 6 grains of caustic potash, or to saturation, dissolving in pure water 2 drachms, and giving from 3 to 6 drops, with excellent effect. *A. T.*]

PIPERINE.

This substance was discovered in pepper, (piper nigrum,) (Jour. de Phys., No. 2, 1820.) by M. Œrstædt, who regarded it as a vegetable alkali.

M. Pelletier has since made an analysis of it, and has proved that piperine, the crystalline matter of the pepper, is not a vegetable alkali; that it has much resemblance to resins, and is of a particular nature. (See Chemical Examination of the Pepper, by M. Pelletier, 8vo., Paris.)

This substance has just been employed in Italy as a febrifuge. I have not yet confirmed by my own experiments the properties which M. Dominique Meli has attributed to it, (Annali Univ. di Medicini, t. 27 and 28;) I shall, therefore, limit myself here to indicating the process which is used to obtain the piperine, and the doses in which it may be employed, in order to induce new attempts with it.

Mode of preparation. Take 2 pounds of the grains of black pepper bruised, which must be digested at a low heat in 3 pounds of alcohol at 36°. It is then to be carried to ebullition, left to rest and cool, then decanted, and the operation repeated with other alcohol. The two liquors are mixed, and into this tincture is poured 2 pounds of distilled water and 3 ounces of hydrochloric acid. The liquor is disturbed, and a precipitate formed of a dark grey color, which is formed for the most part of a fatty matter. This deposit being separated, there are collected on the filter and on the sides of the vase quite handsome crystals, which are nothing else but the piperine. By adding water until the liquid is no longer troubled, a fresh quantity is obtained. This process is the same as that indicated by M. Pelletier. In the memoir which we have cited, this chemist has also obtained the crystalline matter of pepper by the following method: After having exhausted the pepper by alcohol, and evaporated

the tincture, a fatty or resinous matter is obtained, which is submitted to the action of boiling water, which is renewed until the water is colorless; then this fatty matter, thus purified by washing, is dissolved in warm alcohol, and the solution abandoned to itself for several days: many crystals are obtained, which are purified by solutions in alcohol and ether, and by repeated crystallizations. The alcoholic mother waters, abandoned to themselves, may furnish more crystals. This crystalline matter is the piperine.

The crystalline matter of the piperine is presented under the form of prisms with four sides, of which two parellels are evidently the largest: the prisms are terminated by inclined faces. This substance is totally insoluble in cold water; boiling water dissolves a small quantity, which precipitates on cooling. It is very soluble in alcohol, less so in ether, more soluble in warm than cold.

M. Pelletier found that piperine had great analogy with the resin of pepper of cubebs, which M. Vauquelin compares to balsam of capaivi: the piperine in the cubebs must have lost its crystalline properties.

Cases in which the piperine may be administered. According to M. Dominique Meli, the piperine possesses the same febrifuge properties as the alkalis of the bark. He has cured, at the hospital of Ravenna, a great number of fevers with this remedy; and he goes so far as to say that its action is more certain and more prompt than the sulphate of quinine. The piperine must be used in a smaller dose than the sulphate of quinine. Intermittent fevers are the only diseases in which this remedy has been used. It might be used, also, in blennorhagies, in the place of the cubebs pepper.

According to M. Meli, the acrid oil of pepper has the same febrifuge properties as the piperine, but in a less degree. This is owing, no doubt, to that matter retaining a certain quantity of crystalline matter.

UREA.

Urea, the immediate principle of the urine of mammiferous animals, was discovered by Rouelle Cadet, and studied in most of its properties by Fourcroy and M. Vauquelin.

Physical and chemical properties. The purest urea which can be obtained is presented under the form of elongated, brilliant, and pearly scales; it is colorless, transparent, of a fresh and pungent taste, and of a smell analogous to urine.

When it is exposed to a progressive heat, it at first melts, then swells, and soon is decomposed, and furnishes but little carbon, a great quantity of subcarbonate of ammonia, and an inflammable gas of an insupportable smell. It furnishes very little or no water, acetic acid, prussic acid, oxide of carbon, and oil; a property which distinguishes it from all animal matters.

Projected upon burning coals, it is reduced at once to white vapors, which exhale a strong ammoniacal odor.

When urea is exposed to the contact of air, it does not attract humidity; however, it is very soluble in water and alcohol.

An aqueous solution of urea, abandoned to itself, is decomposed by degrees, and becomes ammoniacal. The nitric and nitric acid and chlorine alone alter the solution of urea at the ordinary temperature.

The infusion of galls and the alkalis do not produce any precipitate; but, by heating it a little with alkaline matters, urea is transformed into ammonia, carbonic acid, and acetic acid.

Urea is formed of 28,5 of oxygen, 32,5 of azote, 14,7 of carbon, and 11,8 of hydrogen. M. Berard has given in his thesis, presented to the Faculty of Montpellier, 9th of July, 1817, an analysis which differs a little from this: the proportions he assigns to the different constituent parts of urea are these: oxygen, 26,40; azote, 43,40; carbon, 19,40; hydrogen, 10,80.

Process for obtaining urea. According to M. Thenard, of all the processes for obtaining urea, the best is the following:

Urine, evaporated to the consistence of syrup, is treated by its volume of nitric acid at 24°; the mixture is agitated and plunged into an ice bath to harden the crystals of acid nitrate of urea; it is washed with water at 0, dried and compressed between the folds of blotting paper: when they are thus separated from foreign matters, they are dissolved in water, and are put in contact with the subcarbonate of potash, which seizes the nitric acid and leaves the urea free. This new liquor is evaporated, by a low heat, almost to dryness; the residue is treated by very pure alcohol, which only dissolves the urea; the solution is concentrated, and the urea crystallizes.

Action of urea upon the animal economy. The urea not having been found in any animal fluid but the urine, except it be the blood, when the animal is deprived of its kidneys, M. Segalas wished to ascertain if nephototomized animals died from an accumulation of urea, or from the effect of other elements of the urine: he injected into the veins of several dogs quantities of urea gradually augmented; all the animals survived, and their blood, analyzed, did not offer an atom of urea; but M. Segalas observed that urea thus injected into the veins excited particularly the functions of the urinary organs. The diuretic action of urine upon man has been since confirmed by M. Segalas himself, and by M. Fouquier. We shall observe, however, that with some individuals the urea does not appear to have all the activity which M. Segalas appears disposed to attribute to it.

This physician has given urea in diabetes, but without success. The composition of the morbid urine did not vary; but advantage may be taken of urea to take the place of other diuretics, when the patient becomes habituated to their action.

Mode of administration. Urea has been administered internally in solution in sugared water. It has been given as high as several gros. We should begin by giving but 25 or 30 grains of this substance.

OIL OF EUPHORBIA LATYRIS.

The euphorbia latyris,* known by the name of spurge, is an indigenous annual plant of the family of the euphorbiæ; it contains, like all the euphorbiæ, an irritating and caustic juice. Its seeds have been proposed as a succedaneum to ipecacuanha of late years.

Process to obtain it. When the seeds of the euphorbia latyris are well ripened, they are dried; the black seeds are separated, because they are rancid; and the oil is obtained by simple pressure. 14 ounces of seed give 6 ounces of a very pure oil.

Physical properties of the oil of euphorbia latyris. This oil much resembles the oil ricini: it has the same color; it is a little less dense; it has no odor, is not acid, and has no bad taste; it is very limpid. After a while, and especially when it is warm, this oil is muddy and rancid; then it has a pungent taste. It burns with a fine white flame, without smoke. It does not dissolve in alcohol, even much rectified; it forms a soap with the alkalis.

* Giornale di Fæmacia Chimica, Anno 1824—533. Dr. Charles Calderini has obtained an oil, which may with advantage replace that of the croton tiglium, and which acts, like this last, in a very small dose. This oil is taken from the seeds of the euphorbia latyris, (semina casaputiæ minoris.) The purgative properties of this plant have been known for some time, as Gilibert mentions it as a violent drastic, and Perylhe asserts, that an oven heated with this plant communicates to the bread baked in it purgative properties. Moreover, Sangiorgio, in his History of Medical Plants, thus characterises this plant: Purgante vi infamis quod ad abigendum fœtum auhibeatur. Præstat autem et hac, et tota gente abstinuisse cum causticæ sint, et nimio indomabiles. Haller, Helv., p. 189.

Action upon the animal economy. The action of this oil is purgative; its effect is sure and very prompt: we ought, says the Italian author, to consider it as a very mild purgative; it does not produce vomiting, nor colic, nor tenesmus; it may even be administered in dysenteries, when there is intestinal irritation, with as much advantage as the pulp of tamarinds.

Cases in which it may be administered. The oil of euphorbia latyris has been employed as a purgative in the quotidian gastric fever; in dysentery, when there are marked signs of abdominal irritation, and when that disease is complicated with embarrassment of the primæ viae; it has been used in slight anasarca, often observed as the consequence of intermittent fever, and finally in all cases where it is wished to purge lightly and with a small dose of medicine.

Mode of administration. The dose of oil of spurge, for an adult, varies from 4 to 8 drops.

It has been given to children from two to three years old, united with the paste of chocolate, in the dose of 3 drops. On subjects very irritable, a very good effect is produced by making 8 drops of the oil into an emulsion, rendered very agreeable by adding a little aromatic water (di tutto cedro) and syrup of orange bark.

This oil may be administered in the above doses, in a glass of sugared water.

THRIDACE,
OR
LACTUCARIUM.

The lactucarium of Dr. Duncan, of Edinburgh, such as is prepared in London by Mr. Probart, and the thridace (θριδαξ, lettuce) of Dr. Francis, is nothing else than the white, viscous juice of the garden lettuce, (lactiva sativa hortensis,) extracted without fire, when in flower. This juice has been employed in England for many years, and its properties are found described in the London Pharmacopia, and in the Pharmacologia of Dr. Paris, (2d vol., p. 230, 6th ed., London.)

Physical and chemical properties. The white, viscous juice, obtained from lettuce by incision, is bitter; it concretes and turns brown quickly; it becomes hard and brittle, after the manner of gums, but it easily takes a clammy consistence if it be exposed to the open air. If it be kept in a bottle well stopped, it disengages an odor slightly ammoniacal, and very volatile.

This juice, evaporated by a gentle heat, preserves the peculiar odor of the plant, and is endowed with a very great sapidity.

After drying, it attracts the humidity of the air, which distinguishes it from the extract of lettuce prepared by the ordinary process by means of fire, which continues dry when exposed to the open air; dissolved in distilled water, the filtered solution is clear and of a yellow brown: this liquor reddens strongly litmus paper; ammonia determines in it a white flocculent precipitate, which appears to be formed, for the most part, of phosphate of lime; the aqueous solution of galls occasions, likewise, an abundant precipitate; it is the same with oxalate of ammonia, of nitrate of barytes and sil-

ver, and alcohol in a large quantity; the chloride of platina produces none.

Messrs. Caventou and Boulay, who wished to ascertain if there existed in thridace a peculiar principle analogous to morphine, have not met with any.

Mode of preparation. Mr. Duncan, of Edinburgh, has pointed out, in the memoirs of the Caledonian Horticultural Society, divers means to obtain the juice of the lettuce, which he calls lactucarium: he advises to use cotton, sponge, or pencils to collect it, when it escapes from the incision in the plant; but Mr. Probart, apothecary, at London, has made experiments much more extensive: the results are recorded in the Pharmacologia of Dr. Paris; it is to this author that we owe them. "I planted, says Mr. Probart, rows of lettuce eight inches apart, that a person might pass between them without damaging the stalks. I commence my operations immediately before the time of flowering, and then cut an inch from the end of the stalk; the milky juice immediately runs out and is collected on pieces of cotton cloth about a yard square.

"When these pieces of cotton become charged with the juice, they are put into a vessel containing a very small quantity of water: when this water is sufficiently saturated with juice, it is evaporated, at the ordinary temperature, by pouring it into very shallow dishes. Very soon, that is, after a few hours, the dried juice of the lettuce, lactucarium, is found adhering to the bottom of the vessel, and having the appearance of an extract, but different in its physical properties from all the extracts of lettuce ordinarily prepared.

"By this method, says Mr. Probart, I obtained with much facility the juice of lettuce; but this mode of preparation renders it very dear, on account of the small quantity, comparatively, which is collected.

"This induced me to make farther attempts to see if an extract of lettuce may not be obtained, which shall have all the properties of the lactucarium, and which will cost less than

that I at first obtained. I found that the plant contained much more milky juice when in flower, and the leaves had commenced turning yellow, and I observed that when the plant was cut, the greatest part of the juice concreted in a deposit in the bark of the stalk and in the old leaves, a circumstance which explains how at this time these parts mentioned acquire an extreme bitterness.

"These observations led me naturally to choose this time for my operations, and only to take these parts to prepare my extract. I took care to reject the internal substance of the stalk and the young shoot. I then macerated in water for twenty-four hours the parts retained; then I boiled them for two hours; I then strained the decoction without pressure; I then evaporated, as it could be done with safety, and then got rid of the rest of the water by pouring the concentrated decoction upon plates, as with the lactucarium." Mr. Probart has given to this preparation the name of concentrated extract of lettuce,* to distinguish it from the other extracts of lettuce of the shops. This concentrated extract possesses, according to Mr. Probart, the same properties as the lactucarium or thridace; but it must be given in larger doses.

A concentrated tincture of the juice of lettuce is also prepared.

The following is the process of M. Caventou:

To obtain the thridace, he gathers the lettuce at the time very near its flowering; strips off the leaves and bruises the twigs lightly, and presses them to extract the juice: when it is obtained, it is evaporated, at a temperature not exceeding 30° or 35°, (86° to 95°,) to the consistence of a thick paste.

Action on the animal economy. According to the observations of Dr. Francois, the action of the juice of lettuce is sedative; it diminishes the rapidity of the circulation, and,

* We should remark, that this extract of lettuce does not resemble at all the thridace obtained by the process of M. Caventou.

consequently, the natural heat: it differs very much in this respect from opium.

"Those who use for the first time the thridace, says Dr. Francois, experience at the stomach, as soon as the substance is introduced, a strange sensation, like cold, but not disagreeable. The viscera accustoms itself very soon to its action; also, to obtain an effect several days in succession it is necessary to double rapidly the doses, then to suspend the use of it for a day or two, and return to the first dose, which is ordinarily 2 grains to an adult. If this quantity is not strong enough to procure sleep, the patients, at least, pass the night free from agitation and pain; a calm which they appreciate the better, as it is not accompanied nor followed by drowsiness, stupor, constipation, suspension of the functions, desire, and other inconveniences inevitable to the use of opium or its preparations."

Dr. Francois examined the pulse of twelve patients, with a second watch, and took the temperature of the body by placing a thermometer in the armpit, while they were under the influence of thridace, and he found, on an average, that the pulse beat, before taking the medicine, sixty-seven times in a minute, and during the action of the substance it was reduced to sixty. In some patients, the diminution of the number of pulsations was from ten to twelve: in one individual it was much more. As to the diminution of the temperature, it was estimated with the centigrade thermometer at one degree, and in one or two cases at one and a half.

Cases in which the thridace has been administered. During the month of August, 1824, eleven patients were chosen in the wards of St. Raphael, St. Leon, and St. Michel, at the Hospital de la Pitie. Dr. Francois gave them thridace, prepared by M. Caventou: some were afflicted with rheumatism, others with phthisis, or convalescent from acute diseases; all were deprived of sleep; ten experienced the calming action and somniferous influence of this remedy. From the 25th September to 24th October, thirty-six patients in the

same wards made use of it; they were observed with the greatest care; three had acute rheumatism; eight the same disease in a chronic state; one a quotidian fever; one gastro enteritis; three organic affections of the stomach; two chronic peritonitis; two chronic irritation of the bladder; three phthisis pulmonalis; two hyperthropy of the heart; one a phlegmonous deposit in the arm; the others were convalescents tormented with want of sleep and fatigued with pains in the members. All experienced from its use a relief more or less sensible and durable; their pains were calmed, and they were enabled to enjoy a quiet sleep, of which they had been deprived for a long time. That contraction of the pupils, so evident in persons who take opium, was not observed in any of these.

Dr. Francois observes, also, that persons exhausted by nocturnal spermatic ejections, have been cured by the use of thridace continued six weeks or two months. The dose was 2, 4, 6, 8 grains in the twenty-four hours, in two, three, or four takings.

SALTS OF GOLD.

It was about 1810 that M. Chrestien, physician at Montpellier, called the attention of the faculty to the employment of preparations of gold in medicine, and published in his Iatraleptic [curing by friction] Method the formula of salts which he made use of. Since M. Chrestien, several physicians have made the same attempts, and have not always been so happy.

Four preparations of gold are now principally employed in medicine: 1st, the chloride or muriate of gold; 2d, chloride or muriate of gold and soda; 3d, the oxide of gold, and 4th, oxide of gold by tin, or purple powder of Cassius. We will proceed in succession to make known the mode of preparation and use of these divers compounds.

Mode of preparation of chloride of gold or muriate of gold. To obtain the chloride of gold very pure, 1 part of fine laminated gold is taken, cut up into small pieces, and introduced into a phial of white glass; pour upon it 3 parts of aqua regia, (composed of 1 part of nitric acid and 2 parts of hydrochloric acid,) warm the whole in a sand bath; dispose it so as to be able to collect the whole without loss in case the phial should be broken. The solution of the gold will soon take place. Evaporate the liquor until the odor of chlorine is recognised; which will be easy to ascertain, for it will take place a moment after the mixture of the aqua regia employed, from which the nitric acid alone is disengaged; and the disengagement of chlorine, which takes place immediately after, indicates the commencement of decomposition of a small part of the chloride formed. The vessel is then taken from the fire and left to cool. The chloride is not long in forming a crystalline mass, which resembles a large number of handsome yellow needles. In this state the chloride of gold is as pure as can be desired. It does not contain an

excess of hydrochloric acid, which prevents it from becoming deliquescent. It may be preserved thus in the same phial in which it was prepared, stopped simply with paper, without fearing it will alter.

Physical and chemical properties of the chloride of gold. The chloride of gold is always very acid, but it does not owe this property to a foreign acid; it is in its nature. Its taste is very styptic and disagreeable; it does not attract strongly the humidity of the air but when it contains an excess of hydrochloric acid; it dissolves easily in water, to which it communicates a beautiful yellow color. It colors of a violet purple vegetable and animal matters, and the epidermis when it is touched. Exposed to a moderate heat, it passes to the state of protochloride. With a stronger heat, in a close vessel, it only disengages chlorine without water, and leaves the metallic gold as a residue. Its composition is such, in the state which we describe, that 2 parts of gold should furnish at least 3 parts of chloride.

Mode of preparation of the chloride of gold and sodium, or muriate of gold and soda. Dr. Chrestien, of Montpellier, who first employed the preparations of gold in medicine, seldom makes use of pure chloride of gold; he associates it with the chloride of sodium, so as to make a double salt, known under the name of muriate of gold and soda. It is to Messrs. Fiquier and Javal that we owe what we know most positively upon this double salt, either with the base of soda or potash.

M. Fiquier prepares the chloride of gold and sodium by dissolving 4 parts of gold in aqua regia. Evaporating the solution to dryness, pouring 32 parts of water on the product, 1 part more of the chloride of sodium, and concentrating the liquor to half its weight, that is to say, to 16 parts; by cooling, crystals are obtained composed of 69,3 of chloride of gold, 14,1 of chloride of sodium, and 16,6 of water. M. Javal has made analogous observations on chloride of gold and potassium.

Physical properties of the chloride of gold and sodium. These double salts are of a handsome yellow color, and present the form of elongated, quadrangular prisms; they attract humidity, but less than chloric acid.

Mode of preparation of the oxide of gold. The oxide of gold, which has been used until now by M. Chrestien, has been prepared by means of the carbonate of potash. We also will not omit giving the mode of preparation, after the code of Paris. We always shall take care to make proper additions, and what appears to us to facilitate the success of the operation, although the code has not judged it proper to give them. We shall then propose a process, at the same time more exact and much more convenient, without the nature or the quality of the product being altered in any thing by it.

Process of the code. A quantity of chloride of gold is taken, prepared as already described, it is dissolved in 7 or 8 times its weight of cold distilled water, and the whole introduced into a white glass phial, or into a matrass if large quantities are to be made. Then may be added to the liquor carbonate of potash crystallized or dissolved in a little water, in small quantities, until no more effervescence occurs; the liquor is then carried nearly to ebullition. A precipitate will be seen to form of a gelatinous appearance and very abundant; the liquor is left to cool, and filtered. The precipitate is washed with warm water, until the wash water shall not precipitate very sensibly the solution of nitrate of silver. This will be a proof that the precipitate is sufficiently washed. The oxide is removed from the filter, and dried at the temperature of water elevated to 60 or 70° R., (169 to 192°,) and preserved in a bottle well stopped, and in a dry and dark place.

The liquor in which the precipitate is formed, and the wash water, containing yet much gold, which is of no use for the operation, must be precipitated of the metal by pouring a sufficient quantity of protosulphate of iron into the liquor.

It is seen, in this process, the use of the porcelain capsule is avoided, which is always colored at the expense of a portion of gold; that we recommend to heat the liquor to facilitate the precipitation of the oxide; that we indicate the means to ascertain that it is free from chloride of potassium; and finally, we fix the temperature at which it should be dried, an important remark, and which prevents the giving of gold divided for oxide of gold.

Another process. Take any quantity of chloride of gold, which is to be introduced into a phial of white glass; pour in 6 to 7 times its weight of boiling water to dissolve the chloride, and add, by degrees, crystallized barytes, until the liquor has lost its acidity; which may be easily ascertained by dipping in a strip of blue litmus paper, which will not change its color by this immersion. The liquor is made to boil, and left to cool for filtering. The precipitate is washed several times with warm water; all the washings are mixed, and evaporated almost to dryness, left to cool, and the saline mass dissolved in water. By this means a new quantity of oxide of gold will be separated, which may be united to the preceding. The evaporation of the liquor should be repeated, if judged necessary. These liquors will contain but a small quantity of gold, which may be separated by the usual way; but they are so small that they may be neglected if the operation has been well performed.

The oxide of gold remaining on the filter may then be washed with boiling water, until the wash water does not precipitate with nitrate of silver; then one or two washings must be made with water acidulated with nitric acid; by this means will be removed the little subcarbonate of barytes which may be formed during the operation, and which may remain intermixed with the oxide. Several washings with pure water may be repeated, and it may be ascertained that they are deprived of barytes, when by pouring on a little sulphuric acid no white precipitate is formed; thus purified, the oxide of gold must be dried by the process already given.

By this process, which has perfectly succeeded with M. Caventou, a quantity of chloride of gold containing 3 grammes of this metal has given at least 3 grammes of oxide. There will be obtained at most but the half of this quantity when the subcarbonate of potash is used, because the chloride of potassium which is formed, and the alkali in excess, retain a very large quantity of oxide of gold in the state of solution and colorless compound: such is the result of the experiments of Messrs. Pelletier and Juval.

Properties of the oxide of gold. The oxide of gold in the state of hydrate is yellow; but dried, it is of a violet, almost black. Whatever precautions may be used in the desiccation of this oxide, it is never dissolved entirely in hydrochloric acid; it always leaves a residue, very feeble, it is true, but which arises from this, that in drying one part of the oxide of gold is reduced to a metallic state.

The sulphuric or nitric acids have no action on the oxide of gold. This property may serve to separate the oxides of the same color, which may have been mixed by design; such are those of copper, iron, &c.

Preparation of the oxide of gold by tin or the purple powder of Cassius. To obtain this, dissolve on one part, in at least 16 times its weight of cold distilled water, the chloride of gold, prepared as we have pointed out; and on the other part, prepare a feeble solution of the protohydrochlorate of tin sharpened with hydrochloric acid. This last liquor must be added by little and little to the former, until no more precipitate is thrown down. The liquor must be filtered, and the precipitate well washed with boiling water until the wash waters no longer precipitate with nitrate of silver in solution. This precipitate is then dried at the temperature of boiling water, and this will be the purple powder of Cassius. This precipitate appears to be a combination of deutoxide of tin and of metallic gold.

Action of the salts of gold on the animal economy. According to M. Orfila, 3-4 of a grain of muriate of gold

dissolved and introduced into the jugular vein of a large dog, very strong, produced the following symptoms: difficult and and stertorous respiration, increased heat, suffocation, slight vomiting, which augmented gradually in intensity, and terminated in death. In a second experiment, 1-2 grain of the deutomuriate of gold dissolved in 2 1-2 gros of distilled water was injected into the jugular vein of a small dog; the symptoms succeeded one another with frightful rapidity; in about four minutes the animal was dead. Finally, a strong dog was submitted to a third experiment; 2 grains of the salt were dissolved in 1 1-2 gros of distilled water; the animal presented the same symptoms, and died in about three minutes. On opening these animals it was found that the effect of the salt had particularly acted on the organs of respiration and circulation, and especially on the blood; the lungs were livid, gorged with blood, not crepitating, shrivelled, discolored, and scarcely floating on water; the heart was of a violet color, the ventricle and left cavities were filled with black blood, the right ventricle was drawn in and contracted. The action of this salt on the blood was so prompt, that the crural artery, opened a few moments before death, gave a reddish brown blood, soon passing to black.

The mucous membrane of the alimentary canal was untouched.

M. Orfila also introduced into the stomach of several animals the chloride of gold, to study its direct effect on that viscera. By an opening made in the œsophagus, 3 grains of chloride were introduced into the stomach of a small dog: the animal languished two days and expired the third. Another dog was made to swallow a solution of 10 grains of muriate of gold in one ounce of distilled water: the animal vomited three times, and rendered a frothy slaver; two days after he ate; the fourth day he refused to eat, and died the night of the seventh. On opening the first animal the mucous membrane of the stomach was found inflamed, red, and ulcerated; and with the second, this membrane was also ulcera-

ted and in a state of suppuration. Upon these two animals the muriate of gold had acted in the manner of corrosive substances.

According to M. Chrestien, (Method Iatraleptic, 2d ed., p. 398–9,) "the muriate of gold is infinitely more active than corrosive sublimate, but it is less irritating to the gums; given in the dose of the tenth of a grain a day, it has occasioned in one case a strong fever. The excitement produced by this salt, if restrained within just bounds, is never accompanied by any considerable or even evident derangement of the functions. The mouth is good, the tongue moist, the the appetite continues, the alvine dejections undergo no derangement; there is ordinarily only an augmentation of the urine and transpiration; but in carrying the dose too far, we run the risk of a general erithism, and inflammation even of this or that organ, according to the predisposition of the individual; and fever is announced by an unusual and continued heat of the skin.

M. Cullerier (nephew) has seen patients who could in no manner support the muriate of gold. A lady, forty-five years old, had ulcers of the nasal fossa; this remedy was administered in the dose of the 15th of a grain; at the second dose, there was gastric irritation, redness of the throat, dryness of the tongue, pains in the bowels, and dejections: a 20th of a grain was administered anew when the first symptoms were dissipated; the same effects took place. Several other attempts on the same lady were no more successful. This lady had nearly the same sensibility to the action of mercury; she was only cured by the use of this last means.

According to this same surgeon, the general effects of the hydrochlorate of gold and soda are an internal heat, headaches, dryness of the mouth and pharynx, gastric oppression and irritation, constipation or diarrhea, and acceleration of the circulation. I was consulted by a patient to whom the muriate of gold had been unadvisedly administered; he had only taken this salt in the dose of one tenth of a grain in a

cup of milk for eight days; at the end of that time, he had a very intense gastritis, and after the irritation was calmed, he still experienced an extreme heat of the skin, an obstinate sleepiness, and fatiguing erections; this state of excitement, notwithstanding the mildest and strictest regimen, persisted for about three years, and the patient could not then use wine, even diluted with water.

Cases in which the preparations of gold are administered. Before M. Chrestien, the preparations of gold were used in medicine; they had even been advised against syphilis, in the 16th century, by Gabriel Fallope; but it is not entirely against the venereal disease that M. Chrestien advises the salts of gold; he asserts that he has employed them with success in most of the diseases of the lymphatic system, in scrophula, goitre, dartres, squirrhus, and even tuberculous phthisis. Lalouette, in his Treatise on Scrophula, advises also positively the use of salts of gold. Several physicians who have repeated the experiment of M. Chrestien, have not obtained the same satisfactory results; however, M. Duportal has reported (Annal. de Phys. et de Chim., t. 78, p. 55) two cases of cure effected by this means: one patient had on the face an ulcer which was regarded as cancerous, which had resisted all the treatment ordinarily employed, and which was induced to cicatrise after treatment by the salts of gold.

M. Cullerier (uncle) did not regard the muriate of gold as a specific against syphilis; however he obtained himself cures by this means.

M. Cullerier, jun. has communicated to us the result of his attempts, which he had made with this remedy at the Venereal Hospital: he administered the hydrochlorate of gold and soda to a certain number of patients, of different ages, sexes, and different constitutions, presenting signs of a recent syphilis; such as ulcers, bubos, pustules, excrescences, or inveterate diseases, that is to say, ulcers in the throat, of the palate, of the nostrils, of the parts of generation, &c., exostosis and periostosis, of cutaneous pustules and vague pains and osteo-

copes. In the first case of the first series, the effects of the salt were as prompt as those of mercury; with the others these effects have been less advantageous, and even sometimes nothing: it is necessary, therefore, to recur to mercury.

In consecutive diseases, he obtained some favorable effects: the symptoms have been ameliorated in two or three patients: one alone has been cured completely; in others it has been adminstered in vain.

Mode of employment. M. Chrestien has united the compounds of gold to the extracts of soluble plants, in sugar, with which he forms lozenges, to syrups, to the cerate of Gallien, and to ointments, to make frictions on the soles of the feet, after the manner of Cirillo. Messrs. Duportal and Pelletier disprove these different mixtures, because the vegetable and animal matters, dissolved or not dissolved, decompose the acid solutions of gold, and restore them to the metallic state. Moreover, according to M. Proust, there are few vegetable juices, acids, gums, sugars, extracts, &c. which have not the property to deoxidize gold. It is necessary, then, to avoid the use of these preparations, which are, therefore, very uncertain: the best method to employ these salts of gold is that by friction on the gums; and the hydrochlorate of gold and soda is that which is preferable: reduced to powder, diluted with 15, 12, 10, 8, 6, and even 4 times its weight of the diluent, it has been employed in the Venereal Hospital at Paris. Starch, and the powder of lycopodium washed in alcohol, are the substances which appear to preserve the salts of gold best; decomposition is more or less quick with the other powders, such as those of liquorice, marshmallows, &c.

Frictions with the muriate of gold and soda. M. Chrestien gives the following formulas:

℞ Crystallized muriate of gold and soda, 1 grain,
Powdered Florence iris, (deprived of its soluble parts by alcohol and water,) 2 grains.

The powder of lycopodium is better than that of iris.

The dose is divided at first into 15 parts; thus, in a very gradual manner, we are enabled to divide the grain of muriate into 10 and even 8 parts.

Friction is made once a day on the tongue and on the gums: it is rare, says M. Chrestien, that it requires more than the four first subdivisions of the dose to obtain the cure of the most severe syphilitic diseases.

Pills of oxide of gold.

℞ Extract of the bark of the root of daphne, 2 gros,
Oxide of gold by potash, 6 grains.

Mix exactly, and make 60 equal pills.

The 6 grains of oxide of gold may be replaced by a grain of the triple muriate.

M. Chrestien advises these pills against scrophula and lymphatic enlargements: one a day will be sufficient at first, increasing them gradually until 7 or 8 a day are taken.

Dr. Niel, who wrote upon the use of preparations of gold, has advised a particular method for using these preparations, when the state of the tongue or inside of the mouth does not allow frictions on those parts. This method consists in the the following:

The skin is laid bare on one side of the neck by a small blister, and dressed morning and evening with the following mixture:

℞ Simple ointment, 1 demigros,
Gold divided by mercury, 1 grain.

This quantity of divided gold is increased gradually to 2 grains, when it is replaced by the following ointment:

℞ Simple ointment, 1 demigros,
Muriate of gold and soda, 0 1-10 grain.

SALTS OF PLATINA.

The processes for obtaining the salts of platina are absolutely the same as those employed for the salts of gold: M. Cullerier (uncle) has made several attempts with the hydrochlorate of platina and soda, and the results are the same as those given for the same salts with the base of gold.

NOTE TO PAGE 32.

Professor Hare, of Philadelphia, by precipitation with lead, has been enabled to detect the meconate of morphine in as small a quantity as that contained in 10 drops of laudanum when dissolved in half a gallon of water. By adding a few drops of the acetate of lead to an infusion of opium, the meconate of lead is precipitated. If small quantities are used, six to twelve hours may be required, and stirring with a glass rod. To this precipitate pour, through a glass tube, to the bottom, a little sulphuric acid, which sets free the meconic acid, and, by adding a solution of the red oxide of iron, a red color is produced by its combination with the iron.

Professor Hare has also prepared, by means of ether, denarcotised laudanum, which he has used in several cases, and in one case procured sleep with 10 drops, without the distressing consequences usually experienced by the patient. Dr. Dewees, of Philadelphia, also tried it in one case of severe after pains, where other remedies failed; the most entire success followed, and the lady called it the "divine tinct of opium."

APPENDIX.

1. *Tincture of nux vomica.*

℞ Alcohol at 36°, 2 ounces,
Dry extract of nux vomica, 5 grains.

This may be administered by drops, beginning with 20, and gradually increasing.

2. *Pills of strychnine.* ℞ Pure strychnine, 2 grains,
Conserve of roses, q. s.

Mix exactly, and divide into 30 pills. Give 1 or 2 three times a day.

3. *Tincture of strychnine.* ℞ Alcohol at 36°, 2 ounces,
Strychnine, 5 grains.

Given in drops, from 6 to 24, in the drinks, gradually increasing.

4. *Pills of brucine.* ℞ Pure brucine, 12 grains,
Conserve of roses, q. s.

Mix exactly, and divide into 30 pills. Give 1 or 2 three times a day.

5. *Tincture of brucine.* ℞ Alcohol, 1 ounce,
Brucine, 15 grains.

Given by drops, from 6 to 24, gradually increasing.

6. *Solution of acetate of morphine.*

℞ Acetate of morphine, 13 grains,
Distilled water, 1 ounce.

Mix, and add 3 or 4 drops of acetic acid and 1 drachm of alcohol. Dose, from 6 to 24 drops.

7. *Solution of citrate of morphine.*

℞ Pure morphine, 13 grains,
Crystals of citric acid, 6 1-2 grains,
Distilled water, 1 ounce.

Mix, and color if desired with 2 drachms of cochineal. Dose,

6 to 24 drops in the twenty-four hours. This is substituted for the black drop.

8. *An emetic of emetine.*

℞ Colored emetine, 5 grains,
Distilled or rain water, 2 1-2 ounces,

Give a table spoonful every ten minutes until it operates.

℞ Pure emetine, 1 grain,
Common syrup, 2 1-2 ounces.

Give a table spoonful every fifteen minutes until it operates.

9. *Solution of quinine.*

℞ Sulphate of quinine, 24 grains,
Distilled or rain water, 1 pound.

By the addition of a few drops of sulphuric acid, should it not readily dissolve, that object is obtained; and the addition of white sugar converts it into a pure and clear syrup. Dose, from a tea spoonful to a table spoonful, four or six times in twenty-four hours.

10. *Wine of quinine.* ℞ Sulphate of quinine, 5 grains,
Wine, 1 pint.

Dose, a wine glass full three times in twenty-four hours.

11. *Tincture of quinine.* ℞ Sulphate of quinine, 5 grains,
Alcohol at 34°, 1 ounce.

This may be kept to prepare the wine extemporaneously, by adding 1 ounce of the tincture to a pint of wine. By substituting half as much more cinchonine as quinine the preparations of the former may be made.

12. *Pills of veratrine.* Divide 1 grain into 15 pills, with gum arabic or syrup. Dose, 1 to 3 in twenty-four hours.

13. *Tincture of veratrine.* ℞ Veratrine, 6 1-2 grains,
Alcohol, 2 ounces.

Dose, 10 to 25 drops.

14. *Solution of veratrine.*

℞ Sulphate of veratrine, 1 1-2 grain,
Distilled water, 4 ounces.

Dose, 1 to 2 table spoonfuls.

15. *Veratrine ointment.*

℞ Veratrine, 6 1-2 grains,
Simple ointment, 2 ounces.

16. *Solution of prussic acid.*

℞ Medicinal prussic acid, 1 drachm,
Distilled water, 16 ounces.

Dose, a table spoonful twice in twenty-four hours. White sugar may be used to form a syrup.

17. *Medicinal hydrocyanate of potash* may be used in the same proportions and in the same dose as the above. The *cyanide of zinc* also.

18. *Tincture of gentianine.* ℞ Gentianine, 4 grains,
Alcohol at 24°, 1 ounce.

Dose, 1 tea spoonful to 1 table spoonful.

19. *Syrup of gentianine.* ℞ Gentianine, 12 grains,
Simple syrup, 12 ounces.

Dose, 1 table spoonful.

20. *Tincture of iodine.* ℞ Iodine, 40 grains,
Alcohol at 35°, 1 ounce.

Dose, 6 to 10 drops three times in twenty-four hours, gradually increasing.

21. *Solution of the hydriodate of potash.*

℞ Hydriodate of potash, 30 grains,
Distilled water, 1 ounce.

Dose, 6 drops three times in twenty-four hours.

22. *Ointment of hydriodate of potash.*

℞ Hydriodate of potash, 60 grains,
Simple ointment, 1 1-2 ounce.

A portion as big as a nut used several times a day.

23. *Ointment of iodide of zinc.*

℞ Iodate of zinc, 60 grains,
Simple ointment, 1 ounce.

Used as the above.

24. *Ointment of iodide of mercury.*

℞ Iodide of mercury, 16 1-2 grains.
Simple ointment, 1 1-2 ounce.

The deutoiodide being more active than the protoiodide, the ointment made with the former is used in smaller quantities.

25. *Tincture of the deutoiodide of mercury.*

℞ Deutoiodide of mercury, 16 1-2 grains,
Alcohol at 36°, 1 1-2 ounce.

Dose, 10 to 20 drops.

26. *Pills of the iodide of mercury.*

℞ Iodide of mercury, 1 grain,
Conserve of roses, q. s.

Divide into 5 pills. Dose, 1 morning and evening, increased to 2.

27. *Tincture of lupuline.*

℞ Lupuline contused, 1 ounce,
Alcohol at 36°, 2 ounces.

Digest in a close vessel for six days; press and filter, and add alcohol to make 3 ounces. Dose, 5 to 10 drops.

28. *Soap of croton oil.* ℞ Croton oil, 8 drops,
Caustic potash, 6 grains,
Pure water, 2 drachms.

Dose, 3 to 6 drops.

29. *Solution of urea.* ℞ Urea, 0 1-2 ounce,
Distilled water, 4 ounces.

Dose, 1 table spoonful.

30. *Pills of oxide of gold.*

℞ Oxide of gold by potash, 6 grains,
Powdered lycopodium, q. s.

Divide into 72 equal pills. Dose, 1 in twenty-four hours, gradually augmenting.

31. *Ointment of muriate of gold and soda.*

℞ Muriate of gold and soda, 0 1-12 grain,
Simple ointment, 30 grains.

Used to dress a blister with.

TABLES,

GIVING A COMPARATIVE VIEW OF THE FRENCH WEIGHTS AND MEASURES WITH THOSE USED IN THE UNITED STATES.

French grains.	*English* grains.	*French* grains.	*English* grains.
1	0,8203	6	4,9223
2	1,6407	7	5,7427
3	2,4611	8	6,5631
4	3,2815	9	7,3835
5	4,1019	10	8,2030

grain						*English grs.*	*Troy weight.*
1					=	0,8204	
72	*gros*				=	59,0703 or	℈ij. 19,0703 grs.
576	8	*ounce*			=	472,5625 or	℥vij. 52,56 "
9216	128	16	1	*pound*	=	7561,0000 or	℔xv. ℥vj. 1, "

The above French division is that called *pois de marc*, being that formerly used in France. It is this measure that is used in the body of this work. The English division to which it is reduced is that of *troy weight.*

I have given below the new French divisions, reduced to troy weight also.

French division.		*Troy weight.*						
	grains.							
Milligramme . =	,0154							
Centigramme . =	,1544							
Decigramme . =	1,5444							
Gramme . . . =	15,4440	pd.	oz.	dr.	sc.	gr.		
Decagramme . =	154,440	0	0	2	1	14	44-100	
Hecatogramme =	1544,400	0	3	1	2	4	4-10	
Kilogramme . =	15444,023	2	8	1	0	14		

The French litre contains 2,1133 English pints, and the French pint 2,0171 English; so that the difference between

them and the English quart measure is but trifling, and they may be used as synonymous. The same may be said of their gros and our drachm.

Troy weight.						*French grains.*	
grain							
1	. . . . .				=	1,218	
20	*scruple*.				=	24,378	
60	3	*drachm* .			=	73,135	1 gros. 1,135 gr.
480	24	8	*ounce* . .		=	585,083	1 oz. 9,083 gr.
5760	288	96	12	1 *pound*	=	7021,	12 oz. 1 gros. 27 grs.

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